

SEQUENCE LISTING

<110> BIOCHEM PHARMA INC.

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RIOUX, Clément
CHARLAND, Nathalie

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330

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				aca Thr	_			_	_			1056
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Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly
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	agt Ser 115												-	384
	aaa Lys													432
	gta Val									_		_		480
-	cct Pro								_			_		528
	tat Tyr													576
	gct Ala 195			-	-	_		_						624
	gat Asp													672
	gat Asp													720
	gaa Glu					_		_			_		_	768

				gga Gly			-	_	_						_	816
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_	_			ttg Leu	_		_				-			_		912
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280

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gta gac gga aaa tac Val Asp Gly Lys Tyr 130				

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caa Gln						act										1220

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His Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn
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330

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Thr	Ala	Ala	Gly 420	Ile	Asp	Ser	Lys	Leu 425	Ala	Lys	Gln	Glu	Ser 430	Leu	Ser
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cat								~~~				a - +	222	~~~		1104

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				aca Thr							-			_	1536
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			Glu	atc Ile 565											1728
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330

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Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro Val
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Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu Glu
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Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro Ser
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Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala Pro
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Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser Thr
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Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser Leu
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Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr Asp
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Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met Leu
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Asp Ser Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu Lys
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Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val Ile
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Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu Val
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Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
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                                             60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
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Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
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Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
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Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
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                                            140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
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                                        155
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
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Leu	Ala 210	Gly	Lys	Asn	Met	Gln 215	Pro	Ser	Gln	Leu	Ser 220	Tyr	Ser	Ser	Thr
Ala 225	Ser	Asp	Asn	Asn	Thr 230	Gln	Ser	Val	Ala	Lys 235	Gly	Ser	Thr	Ser	Lys 240
Pro	Ala	Asn	Lys	Ser 245	Glu	Asn	Leu	Gln	Ser 250	Leu	Leu	Lys	Glu	Leu 255	
Asp	Ser	Pro	Ser 260	Ala	Gln	Arg	Tyr	Ser 265	Glu	Ser	Asp	Gly	Leu 270	Val	Phe
Asp	Pro	Ala 275	Lys	Ile	Ile	Ser	Arg 280	Thr	Pro	Asn	Gly	Val 285	Ala	Ile	Pro
His	Gly 290	Asp	His	Tyr	His	Phe 295	Ile	Pro	Tyr	Ser	Lys 300	Leu	Ser	Ala	Leu
Glu 305	Glu	Lys	Ile	Ala	Arg 310	Met	Val	Pro	Ile	Ser 315	Gly	Thr	Gly	Ser	Thr 320
Val	Ser	Thr	Asn	Ala 325	Lys	Pro	Asn	Glu	Val 330	Val	Ser	Ser	Leu	Gly 335	Ser
Leu	Ser	Ser	Asn 340	Pro	Ser	Ser	Leu	Thr 345	Thr	Ser	Lys	Glu	Leu 350	Ser	Ser
Ala	Ser	Asp 355	Gly	Tyr	Ile	Phe	Asn 360	Pro	Lys	Asp	Ile	Val 365	Glu	Glu	Thr
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Lys 385	Ser	Asn	Gln	Ile	Gly 390	Gln	Pro	Thr	Leu	Pro 395	Asn	Asn	Ser	Leu	Ala 400
	Pro			405					410	-				415	_
	Glu		420					425					430		
	Glu	435					440	•	_	_		445		_	
	Lys 450					455					460				
465	Glu				470				_	475					480
	Glu			485					490					495	_
	Lys		500					505					510		
	Arg	515					520					525			_
	His 530					535					540				
545	Gly				550					555					560
	Gly			565					570					575	
	Thr		580					585					590		
	Phe	595					600					605			
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Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
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Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
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Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
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                                    730
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
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Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu
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Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
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Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
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Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
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Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
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Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
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 Phe
 Lys
 Lys
 Asp
 Leu
 Thr
 Glu
 Glu
 Gln
 Ile
 Lys
 Ala
 Ala
 Gln
 Lys
 His

 Leu
 Glu
 Glu
 Val
 Lys
 Thr
 Ser
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	370		Val			375					380	_			
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			Lys	405					410		_			415	
			Met 420					425					430		
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Ala Met Ala Lys Met 545	Leu Leu Phe 530 Asp	Asn Asn Glu 515 Thr	Glu Pro 500 Glu Ala Thr	Lys 485 Glu Ala Ser Ile	470 Pro Gly Pro Tyr Glu 550	Val Asn Ala Gly 535 Leu	Lys Val Val 520 Leu Arg	Pro Gly 505 Asp Gly Leu	Glu 490 Ser Pro Leu Pro	475 Asn Asp Val Asp Ser 555	Ser Pro Gln Ser 540 Gly	Thr Met Glu 525 Val Glu	Asp Leu 510 Lys Ile Val	Asn 495 Asp Leu Phe Ile	480 Gly Pro Glu Asn Lys 560
A1a Met A1a Lys Met 545 Lys	Leu Leu Phe 530 Asp	Asn Glu 515 Thr Gly Leu	Glu Pro 500 Glu Ala Thr Ser	Lys 485 Glu Ala Ser Ile Asp 565	470 Pro Gly Pro Tyr Glu 550 Phe	Val Asn Ala Gly 535 Leu Ile	Lys Val Val 520 Leu Arg	Pro Gly 505 Asp Gly Leu Lys	Glu 490 Ser Pro Leu Pro	475 Asn Asp Val Asp Ser 555 Arg	Ser Pro Gln Ser 540 Gly Tyr	Thr Met Glu 525 Val Glu Arg	Asp Leu 510 Lys Ile Val Ser	Asn 495 Asp Leu Phe Ile Asn 575	480 Gly Pro Glu Asn Lys 560 His
A1a Met A1a Lys Met 545 Lys Trp	Leu Phe 530 Asp Asn Val	Asn Glu 515 Thr Gly Leu Pro	Glu Pro 500 Glu Ala Thr Ser Asp 580	Lys 485 Glu Ala Ser Ile Asp 565 Ser	470 Pro Gly Pro Tyr Glu 550 Phe	Val Asn Ala Gly 535 Leu Ile Pro	Lys Val Val 520 Leu Arg Ala Glu	Pro Gly 505 Asp Gly Leu Lys Glu 585	Glu 490 Ser Pro Leu Pro Leu 570 Pro	475 Asn Asp Val Asp Ser 555 Arg	Ser Pro Gln Ser 540 Gly Tyr	Thr Met Glu 525 Val Glu Arg Gln	Asp Leu 510 Lys Ile Val Ser Pro 590	Asn 495 Asp Leu Phe Ile Asn 575 Thr	480 Gly Pro Glu Asn Lys 560 His
Ada Met Ala Lys Met 545 Lys Trp Glu	Leu Phe 530 Asp Asn Val Pro	Asn Asn Glu 515 Thr Gly Leu Pro Ser 595	Glu Pro 500 Glu Ala Thr Ser Asp 580 Pro	Lys 485 Glu Ala Ser Ile Asp 565 Ser	470 Pro Gly Pro Tyr Glu 550 Phe Arg	Val Asn Ala Gly 535 Leu Ile Pro Gln	Lys Val Val 520 Leu Arg Ala Glu Pro 600	Pro Gly 505 Asp Gly Leu Lys Glu 585 Ala	Glu 490 Ser Pro Leu Pro Leu 570 Pro	475 Asn Asp Val Asp Ser 555 Arg Ser Asn	Ser Pro Gln Ser 540 Gly Tyr Pro	Thr Met Glu 525 Val Glu Arg Gln Gln 605	Asp Leu 510 Lys Ile Val Ser Pro 590 Pro	Asn 495 Asp Leu Phe Ile Asn 575 Thr	480 Gly Pro Glu Asn Lys 560 His Pro
Ada Met Ala Lys Met 545 Lys Trp Glu Ser	Leu Phe 530 Asp Asn Val Pro Asn 610	Asn Glu 515 Thr Gly Leu Pro Ser 595 Pro	Glu Pro 500 Glu Ala Thr Ser Asp 580 Pro Ile	Lys 485 Glu Ala Ser Ile Asp 565 Ser Ser	470 Pro Gly Pro Tyr Glu 550 Phe Arg Pro Glu	Val Asn Ala Gly 535 Leu Ile Pro Gln Lys 615	Lys Val Val 520 Leu Arg Ala Glu Pro 600 Leu	Pro Gly 505 Asp Gly Leu Lys Glu 585 Ala Val	Glu 490 Ser Pro Leu Pro Leu 570 Pro Pro	475 Asn Asp Val Asp Ser 555 Arg Ser Asn Glu	Ser Pro Gln Ser 540 Gly Tyr Pro Pro Ala 620	Thr Met Glu 525 Val Glu Arg Gln Gln 605 Val	Asp Leu 510 Lys Ile Val Ser Pro 590 Pro	Asn 495 Asp Leu Phe Ile Asn 575 Thr Ala Lys	480 Gly Pro Glu Asn Lys 560 His Pro Pro
Ada Met Ala Lys Met 545 Lys Trp Glu Ser Gly 625	Leu Phe 530 Asp Asn Val Pro Asn 610 Asp	Asn Glu 515 Thr Gly Leu Pro Ser 595 Pro Gly	Glu Pro 500 Glu Ala Thr Ser Asp 580 Pro Ile Tyr	Lys 485 Glu Ala Ser Ile Asp 565 Ser Ser Asp	470 Pro Gly Pro Tyr Glu 550 Phe Arg Pro Glu	Val Asn Ala Gly 535 Leu Ile Pro Gln Lys 615 Glu	Lys Val Val 520 Leu Arg Ala Glu Pro 600 Leu Glu	Pro Gly 505 Asp Gly Leu Lys Glu 585 Ala Val Asn	Glu 490 Ser Pro Leu Pro Leu 570 Pro Lys Gly	Asp Val Asp Ser 555 Arg Ser Asn Glu Val 635	Ser Pro Gln Ser 540 Gly Tyr Pro Pro Ala 620 Ser	Thr Met Glu 525 Val Glu Arg Gln 605 Val Arg	Asp Leu 510 Lys Ile Val Ser Pro 590 Pro Arg	Asn 495 Asp Leu Phe Ile Asn 575 Thr Ala Lys Ile	480 Gly Pro Glu Asn Lys 560 His Pro Val Pro 640
Met Ala Lys Met 545 Lys Trp Glu Ser Gly 625 Ala	Leu Phe 530 Asp Asn Val Pro Asn 610 Asp	Asn Glu 515 Thr Gly Leu Pro Ser 595 Pro Gly Asn	Glu Pro 500 Glu Ala Thr Ser Asp 580 Pro Ile Tyr Leu	Lys 485 Glu Ala Ser Ile Asp 565 Ser Ser Asp Val Ser 645	470 Pro Gly Pro Tyr Glu 550 Phe Arg Pro Glu Phe 630 Ala	Val Asn Ala Gly 535 Leu Ile Pro Gln Lys 615 Glu Glu	Lys Val Val 520 Leu Arg Ala Glu Pro 600 Leu Glu Thr	Pro Gly 505 Asp Gly Leu Lys Glu 585 Ala Val Asn Ala	Glu 490 Ser Pro Leu Pro Leu 570 Pro Lys Gly Ala 650	Asp Val Asp Ser 555 Arg Ser Asn Glu Val 635 Gly	Ser Pro Gln Ser 540 Gly Tyr Pro Pro Ala 620 Ser Ile	Thr Met Glu 525 Val Glu Arg Gln 605 Val Arg	Asp Leu 510 Lys Ile Val Ser Pro 590 Pro Arg Tyr Ser	Asn 495 Asp Leu Phe Ile Asn 575 Thr Ala Lys Ile Lys 655	480 Gly Pro Glu Asn Lys 560 His Pro Val Pro 640 Leu
Met Ala Lys Met 545 Lys Trp Glu Ser Gly 625 Ala Ala	Leu Phe 530 Asp Asn Val Pro Asn 610 Asp Lys	Asn Glu 515 Thr Gly Leu Pro Ser 595 Pro Gly Asn Gln	Glu Pro 500 Glu Ala Thr Ser Asp 580 Pro Ile Tyr	Lys 485 Glu Ala Ser Ile Asp 565 Ser Ser Val Ser 645 Ser	470 Pro Gly Pro Tyr Glu 550 Phe Arg Pro Glu Phe 630 Ala Leu	Val Asn Ala Gly 535 Leu Ile Pro Gln Lys 615 Glu Glu Ser	Lys Val Val 520 Leu Arg Ala Glu Pro 600 Leu Glu Thr His	Pro Gly 505 Asp Gly Leu Lys Glu 585 Ala Val Asn Ala Lys 665	Glu 490 Ser Pro Leu Pro Leu 570 Pro Lys Gly Ala 650 Leu	Asp Val Asp Ser 555 Arg Ser Asn Glu Val 635 Gly	Ser Pro Gln Ser 540 Gly Tyr Pro Ala 620 Ser Ile Ala	Thr Met Glu 525 Val Glu Arg Gln 605 Val Arg Asp Lys	Asp Leu 510 Lys Ile Val Ser Pro 590 Pro Arg Tyr Ser Lys 670	Asn 495 Asp Leu Phe Ile Asn 575 Thr Ala Lys Ile Lys 655 Thr	480 Gly Pro Glu Asn Lys 560 His Pro Val Pro 640 Leu Asp

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Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile
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Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr
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Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu
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Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp
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Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu
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Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His Tyr His Asn
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Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly
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Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr Val Glu His
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Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp
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His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn Gln Thr Glu
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Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr
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Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro
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Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu Ala Glu Asp Leu
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<213> S. pneumoniae

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Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
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Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
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Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
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Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
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Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
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Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile
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Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser
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Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly
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Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
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Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser
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Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp
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                                    170
Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His
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                                                    190
Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala
                            200
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Tyr A	210 Arg	Arg	Gln	Asn		215 Asp	Asn	Thr	Pro		220 Thr	Asn	Trp	Val	
225 Ser V	<i>1</i> =1	Sor	Δen	Pro	230	Фhr	Thr	Λen	Ψb∽	235	Ψhr	Sor	Λαn	Λan	240
				245					250					255	
Asn T	Thr	Asn	Ser 260	Gln	Ala	Ser	Gln	Ser 265	Asn	Asp	Ile	Asp	Ser 270	Leu	Leu
Lys 0		275	_	_			280			_		285			-
Gly I	Leu 290	Ile	Phe	Asp	Pro	Ala 295	Gln	Ile	Thr	Ser	Arg 300	Thr	Ala	Arg	Gly
Val A 305	Ala	Val	Pro	His	Gly 310	Asn	His	Tyr	His	Phe 315	Ile	Pro	Tyr	Glu	Gln 320
Met S	Ser	Glu	Leu	Glu 325		Arg	Ile	Ala	Arg		Ile	Pro	Leu	Arg 335	
Arg S	Ser	Asn	His 340		Val	Pro	Asp	Ser 345		Pro	Glu	Glu	Pro		Pro
Gln F	Pro			Glu	Pro	Ser			Pro	Gln	Pro			Asn	Pro
Gln F		355 Ala	Pro	Ser	Asn		360 Ile	Asp	Glu	Lys		365 Val	Lys	Glu	Ala
Val A	370 Ara	Lvs	Val	Glv	Asn	375 Glv	ጥረድ	Val	Phe	Glu	380 Glu	Asn	Gly	Val	Ser
385	.	2,0	Val	CII	390	CIY	- 7 -	VUI	1110	395	Oiu	71511	·	vai	400
Arg T	ſyr	Ile	Pro	Ala 405	Lys	Asn	Leu	Ser	Ala 410	Glu	Thr	Ala	Ala	Gly 415	Ile
Asp S	Ser	Lys	Leu 420	Ala	Lys	Gln	Glu	Ser 425	Leu	Ser	His	Lys	Leu 430	Gly	Ala
Lvs I	ĹVS	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Ara	Glu	Phe	Tvr	Asn	Lvs	Ala
-,	-	435					440	F	9			445		4	
Tyr A		435					440					445			
Tyr A	Asp 150	435 Leu	Leu	Ala	Arg	Ile 455	440 His	Gln	Asp	Leu	Leu 460	445 Asp	Asn	Lys	Gly
Tyr A	Asp 150 Gln	435 Leu Val	Leu Asp	Ala Phe	Arg Glu 470	Ile 455 Ala	440 His Leu	Gln Asp	Asp Asn	Leu Leu 475	Leu 460 Leu	445 Asp Glu	Asn Arg	Lys Leu	Gly Lys 480
Tyr A 4 Arg G 465	Asp 450 Gln Val	435 Leu Val Ser	Leu Asp Ser	Ala Phe Asp 485	Arg Glu 470 Lys	Ile 455 Ala Val	440 His Leu Lys	Gln Asp Leu	Asp Asn Val 490	Leu Leu 475 Asp	Leu 460 Leu Asp	445 Asp Glu Ile	Asn Arg Leu	Lys Leu Ala 495	Gly Lys 480 Phe
Tyr A 4 Arg G 465 Asp V	Asp 150 Gln Val	435 Leu Val Ser Pro	Leu Asp Ser Ile 500	Ala Phe Asp 485 Arg	Arg Glu 470 Lys His	Ile 455 Ala Val Pro	440 His Leu Lys Glu	Gln Asp Leu Arg 505	Asp Asn Val 490 Leu	Leu Leu 475 Asp Gly	Leu 460 Leu Asp	445 Asp Glu Ile Pro	Asn Arg Leu Asn 510	Lys Leu Ala 495 Ala	Gly Lys 480 Phe Gln
Tyr A Arg G 465 Asp V Leu A Ile T Tyr T	Asp 450 Gln Val Ala	435 Leu Val Ser Pro Tyr 515	Leu Asp Ser Ile 500 Thr	Ala Phe Asp 485 Arg Asp	Arg Glu 470 Lys His	Ile 455 Ala Val Pro Glu	440 His Leu Lys Glu Ile 520	Gln Asp Leu Arg 505 Gln	Asp Asn Val 490 Leu Val	Leu Leu 475 Asp Gly Ala	Leu 460 Leu Asp Lys	445 Asp Glu Ile Pro Leu 525	Asn Arg Leu Asn 510 Ala	Lys Leu Ala 495 Ala Gly	Gly Lys 480 Phe Gln Lys
Tyr AArg GAAsp V	Asp 450 31n Val Ala Thr	435 Leu Val Ser Pro Tyr 515 Thr	Leu Asp Ser Ile 500 Thr	Ala Phe Asp 485 Arg Asp	Arg Glu 470 Lys His Asp Gly Tyr	Ile 455 Ala Val Pro Glu Tyr 535	440 His Leu Lys Glu Ile 520 Ile	Gln Asp Leu Arg 505 Gln Phe	Asp Val 490 Leu Val Asp	Leu 475 Asp Gly Ala Pro	Leu 460 Leu Asp Lys Lys Arg 540	445 Asp Glu Ile Pro Leu 525 Asp	Asn Leu Asn 510 Ala Ile	Lys Leu Ala 495 Ala Gly Thr	Gly Lys 480 Phe Gln Lys Ser Trp
Tyr A Arg G 465 Asp V Leu A Ile T Tyr T	Asp 450 Gln Val Ala Thr Thr 530 Glu	435 Leu Val Ser Pro Tyr 515 Thr	Leu Asp Ser Ile 500 Thr Glu Asp	Ala Phe Asp 485 Arg Asp Asp Ala Ser	Arg Glu 470 Lys His Asp Gly Tyr 550	Ile 455 Ala Val Pro Glu Tyr 535 Val	440 His Leu Lys Glu Ile 520 Ile Thr	Gln Asp Leu Arg 505 Gln Phe Pro	Asp Val 490 Leu Val Asp His Glu	Leu 475 Asp Gly Ala Pro Met 555	Leu 460 Leu Asp Lys Lys Arg 540 Thr	445 Asp Glu Ile Pro Leu 525 Asp	Asn Arg Leu Asn 510 Ala Ile Ser	Lys Leu Ala 495 Ala Gly Thr His	Gly Lys 480 Phe Gln Lys Ser Trp 560
Tyr AAsp G	Asp 450 31n Val Ala Thr Thr 530 31u	435 Leu Val Ser Pro Tyr 515 Thr Gly Lys	Leu Asp Ser Ile 500 Thr Glu Asp Asp Glu	Ala Phe Asp 485 Arg Asp Asp Ala Ser 565	Arg Glu 470 Lys His Asp Gly Tyr 550 Leu	Ile 455 Ala Val Pro Glu Tyr 535 Val Ser	440 His Leu Lys Glu Ile 520 Ile Thr	Gln Asp Leu Arg 505 Gln Phe Pro Ala Pro	Asp Val 490 Leu Val Asp His Glu 570	Leu 475 Asp Gly Ala Pro Met 555 Arg	Leu 460 Leu Asp Lys Lys Arg 540 Thr	445 Asp Glu Ile Pro Leu 525 Asp His Ala	Asn Arg Leu Asn 510 Ala Ile Ser Ala His	Lys Leu Ala 495 Ala Gly Thr His Gln 575	Gly Lys 480 Phe Gln Lys Ser Trp 560 Ala
Tyr AArg GAASP V	Asp 450 Gln Val Ala Fhr 530 Glu Lys	435 Leu Val Ser Pro Tyr 515 Thr Gly Lys	Leu Asp Ser Ile 500 Thr Glu Asp Asp Glu 580	Ala Phe Asp 485 Arg Asp Asp Ala Ser 565 Lys	Arg Glu 470 Lys His Asp Gly Tyr 550 Leu Gly	Ile 455 Ala Val Pro Glu Tyr 535 Val Ser Leu	440 His Leu Lys Glu Ile 520 Ile Thr Glu	Gln Asp Leu Arg 505 Gln Phe Pro Ala Pro 585	Asp Val 490 Leu Val Asp His Glu 570 Pro	Leu Leu 475 Asp Gly Ala Pro Met 555 Arg Ser	Leu 460 Leu Asp Lys Lys Arg 540 Thr Ala	445 Asp Glu Ile Pro Leu 525 Asp His Ala Asp	Asn Arg Leu Asn 510 Ala Ile Ser Ala His 590	Lys Leu Ala 495 Ala Gly Thr His Gln 575 Gln	Gly Lys 480 Phe Gln Lys Ser Trp 560 Ala Asp
Tyr A Arg G 465 Asp V Leu A Ile T Tyr T Asp G 545 Ile I Tyr A Ser G Lys A	Asp 450 31n Val Ala Fhr 530 31u Lys Ala Gly	435 Leu Val Ser Pro Tyr 515 Thr Gly Lys Lys Asn 595	Leu Asp Ser Ile 500 Thr Glu Asp Asp Glu 580 Thr	Ala Phe Asp 485 Arg Asp Asp Ala Ser 565 Lys Glu	Arg Glu 470 Lys His Asp Gly Tyr 550 Leu Gly Ala	Ile 455 Ala Val Pro Glu Tyr 535 Val Ser Leu Lys Pro	440 His Leu Lys Glu Ile 520 Ile Thr Glu Thr	Gln Asp Leu Arg 505 Gln Phe Pro Ala Pro 585 Ala	Asp Val 490 Leu Val Asp His Glu 570 Pro	Leu 475 Asp Gly Ala Pro Met 555 Arg Ser Ala	Leu 460 Leu Asp Lys Lys Arg 540 Thr Ala Thr Ile Pro	445 Asp Glu Ile Pro Leu 525 Asp His Ala Asp Tyr 605	Asn Arg Leu Asn 510 Ala Ile Ser Ala His 590 Asn	Lys Leu Ala 495 Ala Gly Thr His Gln 575 Gln Arg	Gly Lys 480 Phe Gln Lys Ser Trp 560 Ala Asp
Tyr AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Asp 450 Gln Val Ala Fhr 530 Glu Lys Ala Gly Ala	435 Leu Val Ser Pro Tyr 515 Thr Gly Lys Lys Asn 595 Ala	Leu Asp Ser Ile 500 Thr Glu Asp Asp Glu 580 Thr	Ala Phe Asp 485 Arg Asp Asp Ala Ser 565 Lys Glu Lys	Arg Glu 470 Lys His Asp Gly Tyr 550 Leu Gly Ala Val	Ile 455 Ala Val Pro Glu Tyr 535 Val Ser Leu Lys	440 His Leu Lys Glu Ile 520 Ile Thr Glu Thr Gly 600 Leu	Gln Asp Leu Arg 505 Gln Phe Pro Ala Pro 585 Ala Asp	Asp Val 490 Leu Val Asp His Glu 570 Pro Glu Arg	Leu Leu 475 Asp Gly Ala Pro Met 555 Arg Ser Ala Met Ile	Leu 460 Leu Asp Lys Lys Arg 540 Thr Ala Thr Ile Pro 620	445 Asp Glu Ile Pro Leu 525 Asp His Ala Asp Tyr 605 Tyr	Asn Arg Leu Asn 510 Ala Ile Ser Ala His 590 Asn Asn	Lys Leu Ala 495 Ala Gly Thr His Gln 575 Gln Arg Leu	Gly Lys 480 Phe Gln Lys Ser Trp 560 Ala Asp Val Gln Asp
Tyr A Arg G 465 Asp V Leu A Ile T Tyr T Asp G 545 Ile I Tyr A Ser G Lys A	Asp 450 Gln Val Ala Thr Phr 530 Glu Lys Ala 519 Ala 610 Phr	435 Leu Val Ser Pro Tyr 515 Thr Gly Lys Lys Asn 595 Ala Val	Leu Asp Ser Ile 500 Thr Glu Asp Asp Glu 580 Thr Lys Glu	Ala Phe Asp 485 Arg Asp Ala Ser 565 Lys Glu Lys Val	Arg Glu 470 Lys His Asp Gly Tyr 550 Leu Gly Ala Val Lys 630	Ile 455 Ala Val Pro Glu Tyr 535 Val Ser Leu Lys Pro 615 Asn	440 His Leu Lys Glu Ile 520 Ile Thr Glu Thr Gly 600 Leu Gly	Gln Asp Leu Arg 505 Gln Phe Pro Ala Pro 585 Ala Asp Ser	Asp Val 490 Leu Val Asp His Glu 570 Pro Glu Arg Leu	Leu Leu 475 Asp Gly Ala Pro Met 555 Arg Ser Ala Met Ile 635	Leu 460 Leu Asp Lys Lys Arg 540 Thr Ala Thr Ile Pro 620 Ile	445 Asp Glu Ile Pro Leu 525 Asp His Ala Asp Tyr 605 Tyr	Asn Arg Leu Asn 510 Ala Ile Ser Ala His 590 Asn Asn His	Lys Leu Ala 495 Ala Gly Thr His Gln 575 Gln Arg Leu Tyr	Gly Lys 480 Phe Gln Lys Ser Trp 560 Ala Asp Val Gln Asp 640

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Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly
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Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu
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Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser
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                                745
Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu
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Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn
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                                            780
Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr
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Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile
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Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser
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                                    90
Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly
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Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
                            120
Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu His Ser Gln His Arg
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Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser
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                                        155
Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp
                                    170
Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His
                                185
Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala
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Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr
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Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser
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Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu
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                                265
Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp
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Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly
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Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
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                                            60
Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala
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Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu
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Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn
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Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu
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Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn
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                                    170
Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala
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Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile
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Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
                        215
His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
                                        235
Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
                245
                                    250
Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
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                                265
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Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn

280

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Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
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                                       315
Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val
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                                    330
Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
            340
                                345
Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala
                           360
Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu
                        375
Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys
                    390
                                        395
Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu
               405
                                    410
Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu
           420
                                425
Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys
                            440
Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe
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Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr
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Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser 40 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu 55 60 Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp 70 Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly 85 90 Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln 105 Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu Arg Tyr 120 Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Glu Pro Ser Pro 135 140 Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro 150 155 Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala 165 170 Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser 180 185

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Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala Gly Ile
                            200
Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Ala
                        215
                                            220
Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala
                                        235
                    230
Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly
                245
                                    250
Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys
            260
                                265
                                                     270
Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe
                            280
                                                285
Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln
                        295
                                            300
Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys
                    310
                                        315
Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser
                325
                                    330
Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp
            340
                                345
Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala
                            360
Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp
                        375
                                            380
Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val
                    390
                                        395
Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln
                405
                                    410
Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp
            420
                                425
His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu
        435
                            440
                                                 445
Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr
                        455
Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly
                    470
Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr
                485
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Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro
                                505
Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu
                            520
Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser
                        535
                                             540
Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu
                    550
                                        555
Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn
                565
                                    570
Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr
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Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu
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Leu Lys Glu Ser Lys
    610
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<211> 568

<212> PRT

<213> S. pneumoniae <400> 64 Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu 55 Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly 70 75 Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val 100 105 Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu Thr Asn 120 Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn Phe Thr 135 Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro Glu Leu 150 155 Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr Pro Asp 165 170 Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu Gly Val 185 190 Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro Gly Gln 200 Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val Ser Tyr 215 220 Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met Ala Ser 230 235 Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr Leu Arg Val 245 250 Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu Val Arg Val 265 Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn Tyr Lys Val 275 280 285 Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly Thr Thr Arg 295 300 Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn Ala Tyr Leu · 310 315 Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu Glu Lys Glu 325 330 Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys Arg Asn Lys 345 Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu Pro Lys Thr 360 Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly Asn Ser Thr

375

390

405

Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro Val Glu Glu

Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu Glu Asn Val

380

395

Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro Ser Gly Glu 420 425 Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala Pro Gln Gly 435 440 Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser Thr Gly Thr 455 Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser Leu Pro Glu 470 475 Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr Asp Asn Gly 485 490 Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met Leu Asp Pro 505 Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu Lys Leu Glu 520 525 Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val Ile Phe Asn 535 540 Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu Val Ile Lys 550 555 Lys Asn Leu Ser Asp Phe Ile Ala 565

<210> 65

<211> 329

<212> PRT

<213> S. pneumoniae

<400> 65

Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu Glu Glu 10 Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln 25 Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile 40 Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly Asp His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile 85 90 Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val 105 Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu Thr Asn 120 125 Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn Phe Thr 135 140 Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro Glu Leu 150 155 Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr Pro Asp 165 170 Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu Gly Val . 190 185 Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro Gly Gln 200 Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val Ser Tyr 215 220 Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met Ala Ser

235

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Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr Leu Arg Val
                245
                                    250
Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu Val Arg Val
           260
                               265
                                                    270
Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn Tyr Lys Val
       275
                           280
                                                285
Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly Thr Thr Arg
                        295
                                            300
Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn Ala Tyr Leu
                    310
                                        315
Asp Asn Gln Ser Thr Tyr Ile Val Glu
                325
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      <211> 240
      <212> PRT
      <213> S. pneumoniae
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Glu Val Pro Ile Leu Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile
Leu Pro Gln Phe Lys Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp
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Glu Lys Val Glu Glu Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys
                            40
Leu Ser Glu Thr Gly Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val
                        55
Pro Thr Val Asp Pro Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser
                    70
                                        75
Tyr Gly Met Lys Leu Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile
                                    90
Glu Leu Tyr Leu Pro Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp
           100
                                105
Phe Thr Gly Glu Ala Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu
                            120
Asn Gly Lys Val Ser Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn
                        135
Lys Pro Ala Asp Ser Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys
                    150
                                        155
Pro Glu Asn Ser Thr Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val
                                    170
Gly Ser Asp Pro Met Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val
           180
                               185
                                                    190
Asp Pro Val Gln Glu Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu
                            200
Gly Leu Asp Ser Val Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg
                       215
                                            220
Leu Pro Ser Gly Glu Val Ile Lys Lys Asn Leu Ser Asp Phe Ile Ala
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                    230
                                        235
      <210> 67
      <211> 555
      <212> PRT
      <213> S. pneumoniae
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Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro 455 Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu 470 475 Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val 485 490 Glu Glu Lys Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp 500 505 Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn 520 525 Asn Leu Leu Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala 535 Glu Lys Leu Leu Ala Leu Leu Lys Glu Ser Lys 550 <210> 68 <211> 428 <212> PRT <213> S. pneumoniae <400> 68 Asp Ile Asp Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr 25 Ser Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg 55 Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg 75 Pro Glu Glu Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro 85 90 Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu 105 Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe 120 Glu Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala 135 140 Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu 150 155 Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg 165 170 Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp 180 185 Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn 200 Leu Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val 215 Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu 230 235 Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val 245 250 Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp 260 265 270

Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His

280

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63/120
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Met Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu 295 Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro 310 315 Ser Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu 325 330 Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg 340 345 Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu 360 Ile Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe 375 Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu 390 395 Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His 405 410 Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val 420 425

<210> 69

<211> 121

<212> PRT

<213> S. pneumoniae

<400> 69

Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala 10 Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp 25 Asn Gly Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly 40 Gln Ala Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln 55 Thr Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser 70 75 Glu Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser 90 Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu 100 105 Lys Leu Arg Glu Ala Glu Asp Leu Leu

<210> 70

115

<211> 132

<212> PRT

<213> S. pneumoniae

<400> 70

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65
                    70
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Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn Ala
                85
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Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr Gln
                               105
            100
Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu Leu
                            120
Lys Glu Ser Lys
   130
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     <211> 226
      <212> PRT
      <213> S. pneumoniae
     <400> 71
Asp Ile Asp Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln
Arg His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr
Ser Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His
Phe Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg
                        55
Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg
                    70
                                        75
Pro Glu Glu Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro
                                    90
Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu
                                105
Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe
                                                125
                            120
Glu Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala
                        135
Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu
                    150
                                        155
Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg
                                    170
Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp
                                185
Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn
                            200
Leu Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val
                        215
Asp Asp
225
      <210> 72
      <211> 203
      <212> PRT
      <213> S. pneumoniae
      <400> 72
Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly
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Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala
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Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro
                            40
Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met
                        55
Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg
                    70
                                        75
Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser
Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala
                                105
Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met
                            120
Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile
                        135
Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp
                    150
                                        155
Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu
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                                    170
Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser
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Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val
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      <211> 819
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      <213> S. pneumoniae
     <400> 73
Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys Lys Glu
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Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
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Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
                    70
                                        75
Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
                                    90
Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp
            100
                                105
Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
       115
                            120
                                                125
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
                        135
                                            140
His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly
Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
                165
                                    170
Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
                                185
Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Glu
       195
                            200
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Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser

220

	Fyr 225	Asn	Ala	Asn	Pro	Val 230	Gln	Pro	Arg	Leu	Ser 235	Glu	Asn	His	Asn	Leu 240
7	Thr	Val	Thr	Pro	Thr 245	Tyr	His	Gln	Asn	Gln 250	Gly	Glu	Asn	Ile	Ser 255	Ser
I	Leu	Leu	Arg	Glu 260	Leu	Tyr	Ala	Lys	Pro 265	Leu	Ser	Glu	Arg	His 270		Glu
S	Ser	Asp	Gly 275		Ile	Phe	Asp	Pro 280		Gln	Ile	Thr	Ser 285		Thr	Ala
Z	Arg	Gly 290		Ala	Val	Pro	His 295		Asn	His	Tyr	His 300		Ile	Pro	Tyr
	31u		Met	Ser	Glu	Leu 310		Lys	Arg	Ile	Ala 315		Ile	Ile	Pro	Leu 320
		Tyr	Arg	Ser	Asn 325	His	Trp	Val	Pro	Asp		Arg	Pro	Glu	Gln 335	
S	Ser	Pro	Gln	Ser 340		Pro	Glu	Pro	Ser 345		Ser	Leu	Gln	Pro 350		Pro
1	Asn	Pro	Gln 355		Ala	Pro	Ser	Asn 360		Ile	Asp	Glu	Lys 365		Val	Lys
(Glu	Ala 370		Arg	Lys	Val	Gly 375		Gly	Tyr	Val	Phe 380		Glu	Asn	Gly
	/al		Arg	Tyr	Ile	Pro 390		Lys	Asp	Leu	Ser 395		Glu	Thr	Ala	Ala 400
(Gly	Ile	Asp	Ser	Lys 405	Leu	Ala	Lys	Gln	Glu 410		Leu	Ser	His	Lys 415	Leu
(3ly	Ala	Lys	Lys 420	Thr	Asp	Leu	Pro	Ser 425	Ser	Asp	Arg	Glu	Phe 430	Tyr	Asn
Ι	Lys	Ala	Tyr 435	Asp	Leu	Leu	Ala	Arg 440	Ile	His	Gln	Asp	Leu 445	Leu	Asp	Asn
Ι	Lys	Gly	Ara	Gln	Val	Asn	Pho	Glu	Va1	T.011	Asp	Asn	Len	T.e.11	Glu	Ara
		450	5		Vai	пор	455	Olu	vai	БСи		460	Lea	Dea	Giu	**** 9
		450				Ser	455					460				
4	Leu 165	450 Lys	Asp	Val	Ser	Ser	455 Asp	Lys	Val	Lys	Leu 475	460 Val	Asp	Asp	Ile	Leu 480
1	Leu 165 Ala	450 Lys Phe	Asp Leu	Val Ala	Ser Pro 485	Ser 470	455 Asp Arg	Lys His	Val Pro	Lys Glu 490	Leu 475 Arg	460 Val Leu	Asp Gly	Asp Lys	Ile Pro 495	Leu 480 Asn
<i>I</i>	Leu 165 Ala Ala Sly	450 Lys Phe Gln Lys	Asp Leu Ile Tyr 515	Val Ala Thr 500 Thr	Ser Pro 485 Tyr Thr	Ser 470 Ile Thr	455 Asp Arg Asp	Lys His Asp Gly 520	Val Pro Glu 505 Tyr	Lys Glu 490 Ile Ile	Leu 475 Arg Gln Phe	460 Val Leu Val Asp	Asp Gly Ala Pro 525	Asp Lys Lys 510 Arg	Ile Pro 495 Leu Asp	Leu 480 Asn Ala Ile
<i>I</i>	Leu 165 Ala Ala Sly	450 Lys Phe Gln Lys	Asp Leu Ile Tyr 515	Val Ala Thr 500 Thr	Ser Pro 485 Tyr Thr	Ser 470 Ile Thr	455 Asp Arg Asp	Lys His Asp Gly 520	Val Pro Glu 505 Tyr	Lys Glu 490 Ile Ile	Leu 475 Arg Gln Phe	460 Val Leu Val Asp	Asp Gly Ala Pro 525	Asp Lys Lys 510 Arg	Ile Pro 495 Leu Asp	Leu 480 Asn Ala Ile
7 T	Leu 165 Ala Ala Gly Thr	450 Lys Phe Gln Lys Ser 530 Trp	Asp Leu Ile Tyr 515 Asp	Val Ala Thr 500 Thr Glu Lys	Ser Pro 485 Tyr Thr Gly Lys	Ser 470 Ile Thr Glu Asp Asp 550	Asp Asp Asp Asp Ala 535 Ser	Lys His Asp Gly 520 Tyr	Val Pro Glu 505 Tyr Val Ser	Lys Glu 490 Ile Ile Thr	Leu 475 Arg Gln Phe Pro Ala 555	460 Val Leu Val Asp His 540 Glu	Asp Gly Ala Pro 525 Met Arg	Asp Lys 510 Arg Thr	Ile Pro 495 Leu Asp His	Leu 480 Asn Ala Ile Ser Ala 560
7 T	Leu 165 Ala Ala Gly Thr	450 Lys Phe Gln Lys Ser 530 Trp	Asp Leu Ile Tyr 515 Asp	Val Ala Thr 500 Thr Glu Lys	Ser Pro 485 Tyr Thr Gly Lys	Ser 470 Ile Thr Glu Asp	Asp Asp Asp Asp Ala 535 Ser	Lys His Asp Gly 520 Tyr	Val Pro Glu 505 Tyr Val Ser	Lys Glu 490 Ile Ile Thr	Leu 475 Arg Gln Phe Pro Ala 555	460 Val Leu Val Asp His 540 Glu	Asp Gly Ala Pro 525 Met Arg	Asp Lys 510 Arg Thr	Ile Pro 495 Leu Asp His	Leu 480 Asn Ala Ile Ser Ala 560
7 T	Leu 165 Ala Ala Gly Thr His 545	450 Lys Phe Gln Lys Ser 530 Trp	Asp Leu Ile Tyr 515 Asp Ile Tyr	Val Ala Thr 500 Thr Glu Lys Ala	Ser Pro 485 Tyr Thr Gly Lys Lys 565	Ser 470 Ile Thr Glu Asp Asp 550	Asp Asp Asp Asp Ala 535 Ser Lys	Lys His Asp Gly 520 Tyr Leu Gly	Val Pro Glu 505 Tyr Val Ser Leu	Lys Glu 490 Ile Ile Thr Glu Thr 570	Leu 475 Arg Gln Phe Pro Ala 555 Pro	460 Val Leu Val Asp His 540 Glu Pro	Asp Gly Ala Pro 525 Met Arg Ser	Asp Lys 510 Arg Thr Ala	Pro 495 Leu Asp His Ala Asp 575	Leu 480 Asn Ala Ile Ser Ala 560 His
7 T	Ceu 465 Ala Ala Gly Thr His 545 Gln	450 Lys Phe Gln Lys Ser 530 Trp Ala Asp	Asp Leu Ile Tyr 515 Asp Ile Tyr Ser	Val Ala Thr 500 Thr Glu Lys Ala Gly 580	Ser Pro 485 Tyr Thr Gly Lys Lys 565 Asn	Ser 470 Ile Thr Glu Asp Asp 550 Glu	Asp Asp Asp Asp Ala 535 Ser Lys Glu	Lys His Asp Gly 520 Tyr Leu Gly Ala	Val Pro Glu 505 Tyr Val Ser Leu Lys 585	Lys Glu 490 Ile Ile Thr Glu Thr 570 Gly	Leu 475 Arg Gln Phe Pro Ala 555 Pro	460 Val Leu Val Asp His 540 Glu Pro Glu	Asp Gly Ala Pro 525 Met Arg Ser Ala	Asp Lys 510 Arg Thr Ala Thr Ile 590	Ile Pro 495 Leu Asp His Ala Asp 575 Tyr	Leu 480 Asn Ala Ile Ser Ala 560 His Asn
	Leu 165 Ala Ala Gly Thr His 545 Gln	450 Lys Phe Gln Lys Ser 530 Trp Ala Asp	Asp Leu Ile Tyr 515 Asp Ile Tyr Ser Lys 595	Val Ala Thr 500 Thr Glu Lys Ala Gly 580 Ala	Ser Pro 485 Tyr Thr Gly Lys 565 Asn Ala	Ser 470 Ile Thr Glu Asp 550 Glu	Asp Asp Asp Asp Ala 535 Ser Lys Glu Lys	Lys His Asp Gly 520 Tyr Leu Gly Ala Val 600	Val Pro Glu 505 Tyr Val Ser Leu Lys 585 Pro	Lys Glu 490 Ile Ile Thr Glu Thr 570 Gly Leu	Leu 475 Arg Gln Phe Pro Ala 555 Pro Ala Asp	460 Val Leu Val Asp His 540 Glu Pro Glu Arg	Asp Gly Ala Pro 525 Met Arg Ser Ala Met 605	Asp Lys 510 Arg Thr Ala Thr Ile 590 Pro	Ile Pro 495 Leu Asp His Ala Asp 575 Tyr	Leu 480 Asn Ala Ile Ser Ala 560 His Asn
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Leu 165 Ala Ala Ala Ala Fhr His 545 Gln Arg	450 Lys Phe Gln Lys Ser 530 Trp Ala Asp Val Gln 610 Asp	Asp Leu Ile Tyr 515 Asp Ile Tyr Lys 595 Tyr His	Val Ala Thr 500 Thr Glu Lys Ala Gly 580 Ala Thr Tyr	Ser Pro 485 Tyr Thr Gly Lys 565 Asn Ala Val His	Ser 470 Ile Thr Glu Asp 550 Glu Thr Lys Glu Asn 630	Asp Asp Asp Ala 535 Ser Lys Glu Lys Val 615 Ile	Lys His Asp Gly 520 Tyr Leu Gly Ala Val 600 Lys Lys	Val Pro Glu 505 Tyr Val Ser Leu Lys 585 Pro Asn Phe	Lys Glu 490 Ile Ile Thr Glu Thr 570 Gly Leu Gly Glu	Leu 475 Arg Gln Phe Pro Ala 555 Pro Ala Asp Ser Trp 635	460 Val Leu Val Asp His 540 Glu Pro Glu Arg Leu 620 Phe	Asp Gly Ala Pro 525 Met Arg Ser Ala Met 605 Ile Asp	Asp Lys 510 Arg Thr Ala Thr Ile 590 Pro Ile Glu	Pro 495 Leu Asp His Ala Asp 575 Tyr Tyr Pro	Leu 480 Asn Ala Ile Ser Ala 560 His Asn Asn His
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Leu 165 Ala Ala Ala Ala Fhr His 545 Gln Arg	450 Lys Phe Gln Lys Ser 530 Trp Ala Asp Val Gln 610 Asp	Asp Leu Ile Tyr 515 Asp Ile Tyr Lys 595 Tyr His	Val Ala Thr 500 Thr Glu Lys Ala Gly 580 Ala Thr Tyr	Ser Pro 485 Tyr Thr Gly Lys 565 Asn Ala Val His	Ser 470 Ile Thr Glu Asp 550 Glu Thr Lys Glu Asn	Asp Asp Asp Ala 535 Ser Lys Glu Lys Val 615 Ile	Lys His Asp Gly 520 Tyr Leu Gly Ala Val 600 Lys Lys	Val Pro Glu 505 Tyr Val Ser Leu Lys 585 Pro Asn Phe	Lys Glu 490 Ile Ile Thr Glu Thr 570 Gly Leu Gly Glu	Leu 475 Arg Gln Phe Pro Ala 555 Pro Ala Asp Ser Trp 635	460 Val Leu Val Asp His 540 Glu Pro Glu Arg Leu 620 Phe	Asp Gly Ala Pro 525 Met Arg Ser Ala Met 605 Ile Asp	Asp Lys 510 Arg Thr Ala Thr Ile 590 Pro Ile Glu	Pro 495 Leu Asp His Ala Asp 575 Tyr Tyr Pro	Leu 480 Asn Ala Ile Ser Ala 560 His Asn Asn His
7	Leu 1465 Ala Ala Gly Thr His 545 Gln Arg Leu Tyr 525 Tyr	450 Lys Phe Gln Lys Ser 530 Trp Ala Asp Val Gln 610 Asp	Asp Leu Ile Tyr 515 Asp Ile Tyr Ser Lys 595 Tyr His Ala	Val Ala Thr 500 Thr Glu Lys Ala Gly 580 Ala Thr Tyr Pro	Ser Pro 485 Tyr Thr Gly Lys 565 Asn Ala Val His Lys 645	Ser 470 Ile Thr Glu Asp 550 Glu Thr Lys Glu Asn 630	Asp Asp Asp Ala 535 Ser Lys Glu Lys Val 615 Ile	Lys His Asp Gly 520 Tyr Leu Gly Ala Val 600 Lys Lys Ser	Val Pro Glu 505 Tyr Val Ser Leu Lys 585 Pro Asn Phe Leu	Lys Glu 490 Ile Ile Thr Glu Thr 570 Gly Leu Gly Glu Glu 650	Leu 475 Arg Gln Phe Pro Ala 555 Pro Ala Asp Ser Trp 635 Asp	460 Val Leu Val Asp His 540 Glu Pro Glu Arg Leu 620 Phe Leu	Asp Gly Ala Pro 525 Met Arg Ser Ala Met 605 Ile Asp Leu	Asp Lys 510 Arg Thr Ala Thr Ile 590 Pro Ile Glu Ala	Ile Pro 495 Leu Asp His Ala Asp 575 Tyr Tyr Pro Gly Thr 655	Leu 480 Asn Ala Ile Ser Ala 560 His Asn Asn His Leu 640 Val

Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp 680 Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr 695 700 His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser 710 715 Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu 730 725 Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys 760 765 Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly 775 Leu Lys Ser Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser 790 795 Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala 805 810 Pro Ile Gln

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<212> PRT

<213> S. pneumoniae

<400> 74

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Leu Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln
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Val Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe
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Asp Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro
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His Met Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala
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Glu Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro
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Pro Ser Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala
                325
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Glu Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp
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                                345
Arg Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser
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Leu Ile Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp
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Phe Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp
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Leu Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro
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                                    410
His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn
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Lys Ala Asp Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu
                            440
Val Ser Glu Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala
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Gly Leu Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr
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Glu Glu Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile
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Pro Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu
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Ala Leu Leu Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met
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                            520
Glu Thr Leu Thr Gly Leu Lys Ser Ser Leu Leu Gly Thr Lys Asp
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Glu Ser Gln Pro Ala Pro Ile Gln
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Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro
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35 40 45
Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp

Glu Ala Glu Ile Pro Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile
65 70 70 75 75 80

Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp Pro Ser Ile Arg
85 90 95

Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser Ser Leu Leu Leu
100 105 70 110

Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val Asp Ser Leu Leu
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Ala Leu Leu Lys Glu Ser Gln Pro Ala Pro Ile Gln
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2460

2520

2580

2640

2700

2820

2880

2940

3000

3060

3120

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cctccttcga cagaccatca ggattcagga aatactgagg caaaaggagc agaagctatc
tacaaccgcg tgaaagcagc taagaaggtg ccacttgatc gtatgcctta caatcttcaa
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gatettttgg egaetgteaa gtaetatgte gaacateeaa aegaaegtee geatteagat
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gaagaagaat caccagagga atcagaagaa cctcaggtcg agactgaaaa ggttgaagaa
aaactgagag aggctgaaga tttacttgga aaaatccagg atccaattat caagtccaat
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Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
                            40
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val
                        55
                                            60
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
                    70
                                        75
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
                85
                                    90
Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro
                                105
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
       115
                            120
                                                125
Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala
                        135
Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val
                    150
                                        155
Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn
                165
                                    170
Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala
                                185
Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys
       195
                            200
                                                205
Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr
                        215
                                            220
Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp
                    230
Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu Glu
                245
                                    250
Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile
                                265
                                                    270
Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro
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                                                285
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Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu
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Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp
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Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His
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                                    330
Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala
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Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp
                            360
His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr
                        375
                                            380
Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr
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                                        395
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro
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                                    410
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly
                                425
Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr
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Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn
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Gly Phe Gly Asn Ala Ser Asp His Val
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Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
                        55
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
                    70
                                        75
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
                85
                                    90
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
            100
                                105
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
                            120
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
                        135
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
                    150
                                        155
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
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                                    170
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
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185 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Lys Ala His 200

205

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Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
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Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
                    230
                                       235
Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
               245
                                   250
Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
            260
                                265
Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
                            280
His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
                        295
                                           300
Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr
                   310
                                        315
Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
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                                    330
Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
                                345
           340
                                                    350
Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
                            360
Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
                        375
                                            380
Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala
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                                        395
Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys
                405
                                    410
His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu
                                425
Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe
                         440
Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His
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                                            460
Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser
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                                        475
His Glu Gln Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp
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Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val
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Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr
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Pro His Gly Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro
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Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu
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Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu
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Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln
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Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro
                            600
Pro Glu Leu Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile
                        615
                                            620
Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
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                                       635
Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
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                                    650
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
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Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
                            680
Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
                        695
                                            700
Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
                                        715
                    710
Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
                                    730
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala Glu
                            40
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile
                    70
                                        75
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser
Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly
                                105
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
       115
                            120
Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu His Ser Gln His Arg
                        135
Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser
                    150
                                        155
Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp
                165
                                    170
Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His
            180
                                185
Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala
        195
                            200
Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr
                        215
                                            220
Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro
                   230
                                        235
Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser
                245
                                    250
Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu
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                                265
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Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp
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Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly
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Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln
                    310
                                        315
Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu Arg Tyr
                325
                                    330
Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Glu Pro Ser Pro
                                345
Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro
                            360
Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala
                        375
                                            380
Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser
                    390
                                        395
Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala Gly Ile
                405
                                    410
Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Ala
                                425
Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala
        435
                            440
Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly
                        455
                                            460
Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys
                    470
                                        475
Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe
                485
                                    490
Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln
            500
                                505
Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys
        515
                            520
                                                 525
Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser
                        535
Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp
                    550
                                        555
Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Gln Ala
                                    570
Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp
                                585
Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val
                            600
                                                 605
Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln
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                                            620
Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp
                    630
                                        635
His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu
                                    650
Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr
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Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly
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Asn Ala
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Glu Gly Ile Ser Ala Glu Gln Ile Val Val Lys Ile Thr Asp Gln Gly
Tyr Val Thr Ser His Gly Asp His Tyr His Phe Tyr Asn Gly Lys Val
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Pro Tyr Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Thr Asp Pro Asn
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Tyr Arg Phe Lys Gln Ser Asp Val Ile Asn Glu Ile Leu Asp Gly Tyr
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Lys Gly Thr Lys Glu Ala Lys Glu Lys Gly Leu Ala Gln Val Ala His
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Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Ser Pro Thr Asp Ile Ile
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77/120

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120

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Lys Arg Lys Asn Ile Arg Thr Lys Gln Gln Ile Ala Glu Gln Val Ala
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Lys Gly Thr Lys Glu Ala Lys Glu Lys Gly Leu Ala Gln Val Ala His
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Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
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Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
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Thr	Thr	Asn	Asp	Gly 165		Val	Phe	Asn	Pro 170		Asp	Ile	Ile	Glu 175	
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Leu	Ala 210		Lys	Asn	Met	Gln 215		Ser	Gln	Leu	Ser 220		Ser	Ser	Thr
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Ala Lys 385 Thr His Asp Phe Leu 465	Ser Thr 370 Ser Pro Glu Glu Lys 450	Asp 355 Ala Asn Ser Glu Ser 435 Lys	340 Gly Tyr Gln Pro Asp 420 Gly Asp	Pro Tyr Ile Ile Ser 405 Gly Phe Leu Lys	Ile Val Gly 390 Leu Tyr Val Thr Thr 470	Phe Arg 375 Gln Pro Gly Met Glu 455 Ser	Asn 360 His Pro Ile Phe Ser 440 Glu	345 Pro Gly Thr Asn Asp 425 His Gln Asn	Thr Lys Asp Leu Pro 410 Ala Gly Ile Gly Lys	Asp His Pro 395 Gly Asn Asp Lys Leu 475	Phe 380 Asn Thr Arg His Ala 460 Asp	Val 365 His Asn Ser Ile Asn 445 Ala Ser	350 Glu Tyr Ser His Ile 430 His Gln Leu	Ser Glu Ile Leu Glu 415 Ala Tyr Lys Ser Leu	Thr Pro Ala 400 Lys Glu Phe His Ser 480
Ala Lys 385 Thr His Asp Phe Leu 465 His	Ser Thr 370 Ser Pro Glu Glu Lys 450 Glu	Asp 355 Ala Asn Ser Glu Ser 435 Lys Glu Gln	340 Gly Tyr Gln Pro Asp 420 Gly Asp Val Asp	Pro Tyr Ile Ile Ser 405 Gly Phe Leu Lys Tyr 485	Ile Val Gly 390 Leu Tyr Val Thr 470 Pro	Phe Arg 375 Gln Pro Gly Met Glu 455 Ser Ser	Asn 360 His Pro Ile Phe Ser 440 Glu His Asn	345 Pro Gly Thr Asn Asp 425 His Gln Asn Ala	Thr Lys Asp Leu Pro 410 Ala Gly Ile Gly Lys 490	Asp His Pro 395 Gly Asn Asp Lys Leu 475 Glu	Phe 380 Asn Thr Arg His Ala 460 Asp Met	Val 365 His Asn Ser Ile Asn 445 Ala Ser Lys	350 Glu Tyr Ser His Ile 430 His Gln Leu Asp	Ser Glu Ile Leu Glu 415 Ala Tyr Lys Ser Leu 495	Thr Pro Ala 400 Lys Glu Phe His Ser 480 Asp
Ala Lys 385 Thr His Asp Phe Leu 465 His	Ser Thr 370 Ser Pro Glu Glu Lys 450 Glu Glu	Asp 355 Ala Asn Ser Glu Ser 435 Lys Glu Gln Ile	340 Gly Tyr Gln Pro Asp 420 Gly Asp Val Asp	Pro Tyr Ile Ile Ser 405 Gly Phe Leu Lys Tyr 485 Glu	Ile Val Gly 390 Leu Tyr Val Thr 470 Pro	Phe Arg 375 Gln Pro Gly Met Glu 455 Ser Ser	Asn 360 His Pro Ile Phe Ser 440 Glu His Asn Ala	345 Pro Gly Thr Asn Asp 425 His Gln Asn Ala Gly 505	Thr Lys Asp Leu Pro 410 Ala Gly Ile Gly Lys 490 Ile	Asp His Pro 395 Gly Asn Asp Lys Leu 475 Glu Met	Phe 380 Asn Thr Arg His Ala 460 Asp Met Lys	Val 365 His Asn Ser Ile Asn 445 Ala Ser Lys Gln	350 Glu Tyr Ser His Ile 430 His Gln Leu Asp	Ser Glu Ile Leu Glu 415 Ala Tyr Lys Ser Leu 495 Gly	Thr Pro Ala 400 Lys Glu Phe His Ser 480 Asp Val
Ala Lys 385 Thr His Asp Phe Leu 465 His Lys	Ser Thr 370 Ser Pro Glu Glu Lys 450 Glu Glu Lys	Asp 355 Ala Asn Ser Glu Ser 435 Lys Glu Gln Ile Glu 515	340 Gly Tyr Gln Pro Asp 420 Gly Asp Val Asp Glu 500 Ser	Pro Tyr Ile Ile Ser 405 Gly Phe Leu Lys Tyr 485 Glu Ile	Ile Val Gly 390 Leu Tyr Val Thr 470 Pro Lys Val	Phe Arg 375 Gln Pro Gly Met Glu 455 Ser Ser Ile Val	Asn 360 His Pro Ile Phe Ser 440 Glu His Asn Ala Asn 520	345 Pro Gly Thr Asn Asp 425 His Gln Asn Ala Gly 505 Lys	Thr Lys Asp Leu Pro 410 Ala Gly Ile Gly Lys 490 Ile Glu	Asp His Pro 395 Gly Asn Asp Lys Leu 475 Glu Met Lys	Phe 380 Asn Thr Arg His Ala 460 Asp Met Lys Asn Asp	Val 365 His Asn Ser Ile Asn 445 Ala Ser Lys Gln Ala 525	350 Glu Tyr Ser His Ile 430 His Gln Leu Asp Tyr 510 Ile	Ser Glu Ile Leu Glu 415 Ala Tyr Lys Ser Leu 495 Gly Ile	Thr Pro Ala 400 Lys Glu Phe His Ser 480 Asp Val Tyr
Ala Ala Lys 385 Thr His Asp Phe Leu 465 His Lys Lys	Ser Thr 370 Ser Pro Glu Glu Lys 450 Glu Glu Lys Arg His	Asp 355 Ala Asn Ser Glu Ser 435 Lys Glu Gln Ile Glu 515 Gly	340 Gly Tyr Gln Pro 420 Gly Asp Val Asp Glu 500 Ser Asp	Pro Tyr Ile Ile Ser 405 Gly Phe Leu Lys Tyr 485 Glu Ile His	Ile Val Gly 390 Leu Tyr Val Thr 470 Pro Lys Val His	Phe Arg 375 Gln Pro Gly Met Glu 455 Ser Ser Ile Val His 535	Asn 360 His Pro Ile Phe Ser 440 Glu His Asn Ala Asn 520 Ala	345 Pro Gly Thr Asn Asp 425 His Gln Asn Ala Gly 505 Lys Asp	Thr Lys Asp Leu Pro 410 Ala Gly Ile Gly Lys 490 Ile Glu Pro	Asp His Pro 395 Gly Asn Asp Lys Leu 475 Glu Met Lys	Phe 380 Asn Thr Arg His Ala 460 Asp Met Lys Asn Asp 540	Val 365 His Asn Ser Ile Asn 445 Ala Ser Lys Gln Ala 525 Glu	350 Glu Tyr Ser His Ile 430 His Gln Leu Asp Tyr 510 Ile His	Ser Glu Ile Leu Glu 415 Ala Tyr Lys Ser Leu 495 Gly Ile Lys	Thr Pro Ala 400 Lys Glu Phe His Ser 480 Asp Val Tyr Pro

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Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
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Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
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Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
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Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
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Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
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Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
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Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
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Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
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                                        955
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
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                                    970
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
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Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
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Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
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Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
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Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
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Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
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Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
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                                        155
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
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Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
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Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
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Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
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                                        235
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Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
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Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
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                            280
                                                285
His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
                        295
Glu Glu Lys Ile Ala Arg Arg Val Pro Ile Ser Gly Thr Gly Ser Thr
Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
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                                    330
Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
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Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
                            360
Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
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                                            380
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Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala
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Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Ile Ser His Glu Lys
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                                   410
His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu
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Asp Glu Ser Gly Phe Ile Met Ser His Gly Asn His Asn His Tyr Phe
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Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His
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Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser
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                                        475
His Glu Gln Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp
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                                    490
Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val
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                                505
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Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr
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Pro His Gly Asp His His Ala Asp Pro Ile Asp Glu His Lys Pro
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Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu
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Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu
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Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro
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Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
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Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
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Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
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Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
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Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
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Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
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Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
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Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
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Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu
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Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
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Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
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Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
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                                        875
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
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Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
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Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
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                                            940
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
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Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Glu Glu
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                                    970
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
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Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
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Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
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Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
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Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
            100
                                105
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Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
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Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
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Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
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                                       155
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
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                                    170
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
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Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
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200

205

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Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
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Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
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Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
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Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
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His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
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                                            300
Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr
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Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
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Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
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Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
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Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
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Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala
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Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys
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His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu
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Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe
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Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His
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His Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp
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Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val
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Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr
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Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu
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Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro
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Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
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Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
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Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
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Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
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Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
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Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
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Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
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Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
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Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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Arg Asn Lys Ala Gln Glu Asn Leu Lys Leu Asp Glu Lys Val Glu Glu
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Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
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Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
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Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
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Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
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Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
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Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
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Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Glu Glu
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Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
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                                                    990
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Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly 55 60 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe 70 75 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly 100 1.05 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg 120 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn 135 Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr 150 155 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp 165 170 Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile 185 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Lys Ala His 200 Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr 215 220 Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys 230 235 Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr 245 250 Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe 265 Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro 275 280 285 His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu 295 Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr 310 315 Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser 325 330 Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser 340 345 Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr 360 365 Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro 375 380 Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala 390 395 Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys 405 410 His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu 425 Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe 440 Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His 455 460 Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser 465 470 475

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Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr
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Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu
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Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu
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Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
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Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
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Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
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Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
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Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
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Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
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Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu
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Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
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Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
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Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
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Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
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Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
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                            920
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Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
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Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Glu Glu
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                                    970
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
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Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
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                            40
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
                    70
                                        75
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
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                85
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
            100
                                105
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
                            120
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
                        135
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
                    150
                                        155
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
                                    170
Thr Gly Asn Ala Tyr Ile Val Pro His Arg Gly His Tyr His Tyr Ile
           180
                                185
                                                    190
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Lys Ala His
       195
                            200
                                                205
Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
                        215
Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
                    230
                                        235
Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
                245
                                    250
Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
                                265
Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
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                                                285
His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
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Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr
                    310
                                        315
Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
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Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
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Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
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                            360
Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
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                                            380
Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala
                    390
                                        395
Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys
                405
                                    410
His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu
           420
                                425
Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe
       435
                            440
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Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His
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Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser
                    470
                                        475
His Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp
                485
                                    490
Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val
           500
                                505
Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr
                            520
Pro His Gly Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro
                       535
Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu
                   550
                                        555
Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu
                565
                                    570
Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln
            580
                                585
Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro
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Pro Glu Leu Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile
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                                            620
Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
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                   630
Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
                645
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
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                                665
Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
                            680
Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
                        695
Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
                    710
                                        715
Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
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                725
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
            740
                                745
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Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn 755 760 765

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Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
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                                            780
Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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                    790
Arg Asn Lys Ala Gln Glu Asn Ser Lys Phe Asp Glu Lys Val Glu Glu
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                                    810
Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
                            840
                                                845
Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
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                        855
Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
                    870
                                        875
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
                                    890
                885
Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
                                905
Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
                            920
      915
Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
                        935
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
                    950
                                        955
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
               965
                                    970
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
                                985
                                                   990
Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
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Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala
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            2.0
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Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
                    70
                                        75
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
                                    90
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
            100
                                105
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
                            120
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Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Arg Gly His Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly Asp His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu

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Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln
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                                585
Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro
        595
                            600
                                                605
Pro Glu Leu Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile
                        615
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Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
                    630
                                        635
Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
                                665
Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
                            680
Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
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                                            700
Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
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                    710
Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
                                    730
                725
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
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                                745
Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
        755
                            760
Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
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                                            780
Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
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                                        795
Arg Asn Lys Ala Gln Glu Asn Ser Lys Phe Asp Glu Lys Val Glu Glu
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Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
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Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
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Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
                        855
                                            860
Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
                                        875
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
                885
                                    890
Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
                                905
Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
                            920
Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
                        935
                                            940
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
                    950
                                        955
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
                965
                                    970
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
                                                    990
                                985
Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
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                                                1005
Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala
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                        1015
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Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
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Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
                            40
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
                        55
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
                    70
                                        75
Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
                                    90
Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp
                                105
Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
                            120
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
                        135
                                            140
His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly
                   150
                                        155
Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
                165
                                    170
Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
            180
                                185
Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Ala Glu
                            200
                                                205
Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser Ser
                        215
                                            220
Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His Asn Leu
Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser
                245
                                    250
Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu
                                265
Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala
                            280
                                                285
Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr
                        295
                                            300
Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu
                                        315
                    310
Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro
                325
                                    330
Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala Pro
            340
                                345
                                                    350
Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys
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Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
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                                            380
Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala
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                                        395
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<210> 90 <211> 819

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Gly	Ile	Asp	Ser	Lys 405	Leu	Ala	Lys	Gln	Glu 410	Ser	Leu	Ser	His	Lys 415	Leu
Gly	Ala	Lys	Lys 420	Thr	Asp	Leu	Pro	Ser 425	Ser	Asp	Arg	Glu	Phe 430	Tyr	Asn
Lys	Ala	Tyr 435	Asp	Leu	Leu	Ala	Arg 440	Ile	His	Gln	Asp	Leu 445	Leu	Asp	Asn
Lys	Gly 450	Arg	Gln	Val	Asp	Phe 455	Glu	Val	Leu	Asp	Asn 460	Leu	Leu	Glu	Arg
Leu 465	Lys	Asp	Val	Ser	Ser 470	Asp	Lys	Val	Lys	Leu 475	Val	Asp	Asp	Ile	Leu 480
	Phe	Leu	Ala	Pro 485		Arg	His	Pro	Glu 490		Leu	Gly	Lys	Pro 495	
Ala	Gln	Ile	Thr 500		Thr	Asp	Asp	Glu 505		Gln	Val	Ala	Lys 510		Ala
Gly	Lys	Tyr 515		Thr	Glu	Asp	Gly 520		Ile	Phe	Asp	Pro 525		Asp	Ile
Thr	Ser 530	Asp	Glu	Gly	Asp	Ala 535	Tyr	Val	Thr	Pro	His 540	Met	Thr	His	Ser
His 545	Trp	Ile	Lys	Lys	Asp 550	Ser	Leu	Ser	Glu	Ala 555	Glu	Arg	Ala	Ala	Ala 560
Gln	Ala	Tyr	Ala	Lys 565	Glu	Lys	Gly	Leu	Thr 570	Pro	Pro	Ser	Thr	Asp 575	His
Gln	Asp	Ser	Gly 580	Asn	Thr	Glu	Ala	Lys 585	Gly	Ala	Glu	Ala	Ile 590	Tyr	Asn
Arg	Val	Lys 595	Ala	Ala	Lys	Lys	Val 600	Pro	Leu	Asp	Arg	Met 605	Pro	Tyr	Asn
Leu	Gln 610	Tyr	Thr	Val	Glu	Val 615	Lys	Asn	Gly	Ser	Leu 620	Ile	Ile	Pro	His
Tyr 625	Asp	His	Tyr	His	Asn 630	Ile	Lys	Phe	Glu	Trp 635	Phe	Asp	Glu	Gly	Leu 640
Tyr	Glu	Ala	Pro	Lys 645	Gly	Tyr	Ser	Leu	Glu 650	Asp	Leu	Leu	Ala	Thr 655	Val
Lys	Tyr	Tyr	Val 660	Glu	His	Pro	Asn	Glu 665	Arg	Pro	His	Ser	Asp 670	Asn	Gly
Phe	Gly	Asn 675	Ala	Ser	Asp	His	Val 680	Arg	Lys	Asn	Lys	Ala 685	Asp	Gln	Asp
Ser	Lys 690	Pro	Asp	Glu	Asp	Lys 695	Glu	His	Asp	Glu	Val 700	Ser	Glu	Pro	Thr
His 705	Pro	Glu	Ser	Asp	Glu 710	Lys	Glu	Asn	His	Ala 715	Gly	Leu	Asn	Pro	Ser 720
Ala	Asp	Asn	Leu	Tyr 725	Lys	Pro	Ser	Thr	Asp 730	Thr	Glu	Glu	Thr	Glu 735	Glu
Glu	Ala	Glu	Asp 740	Thr	Thr	Asp	Glu	Ala 745	Glu	Ile	Pro	Gln	Val 750	Glu	Asn
Ser	Val	Ile 755	Asn	Ala	Lys	Ile	Ala 760	Asp	Ala	Glu	Ala	Leu 765	Leu	Glu	Lys
Val	Thr 770	Asp	Pro	Ser	Ile	Arg 775	Gln	Asn	Ala	Met	Glu 780	Thr	Leu	Thr	Gly
Leu 785	Lys	Ser	Ser	Leu	Leu 790	Leu	Gly	Thr	Lys	Asp 795	Asn	Asn	Thr	Ile	Ser 800
Ala	Glu	Val	Asp	Ser 805	Leu	Leu	Ala	Leu	Leu 810	Lys	Glu	Ser	Gln	Pro 815	Ala
Pro	Ile	Gln													

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<213> S. pneumoniae

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Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala

Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys

395

410

390

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Leu Glý Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr
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                                425
Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp
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Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu
                        455
                                            460
Arg Leu Lys Asp Val Pro Ser Asp Lys Val Lys Leu Val Asp Asp Ile
                    470
                                        475
Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro
                                    490
Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu
                                505
Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp
                            520
Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His
                        535
                                            540
Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala
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Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp
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                                    570
His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr
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                                585
Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr
                            600
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro
                                            620
                        615
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly
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                                        635
Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr
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                                    650
Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn
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                                665
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Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Val Asp Gln
                            680
                                                685
Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro
                        695
                                            700
Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro
                    710
                                        715
Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu
               725
                                    730
Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu
                                745
Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu
       755
                            760
Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr
                        775
                                            780
Gly Leu Lys Ser Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile
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Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro
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                                    810
Ala Pro Ile Gln
            820
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      <213> S. pneumoniae
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Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
                           440
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
                       455
                                           460
Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
                   470
                                       475
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
                                    490
                485
Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
                            520
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
                        535
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Gln Ala Tyr
                   550
                                       555
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Arg Asp Ser
               565
                                    570
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
            580
                                585
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
                            600
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
                        615
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
                   630
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Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
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Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
           660
                               665
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
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Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
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                                            700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
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                                        715
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
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Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
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                               745
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
                           760
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
                        775
                                            780
Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
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                                       795
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
               805
                                   810
     <210> 93
     <211> 816
      <212> PRT
      <213> S. pneumoniae
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Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Asp Lys Lys Glu

<400> 93

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Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
                            40
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
                    70
Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
                85
                                    90
Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn
Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
                            120
                                                125
Arg Thr Lys Glu Glu Ile Lys Arg Gln Arg Gln Glu His Ser His Asn
                        135
                                            140
His Gly Gly Gly Ser Asn Asp Gln Ala Val Val Ala Ala Arg Ala Gln
                    150
                                        155
Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile
                                    170
                165
Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asn His Phe
                                185
His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala
                            200
                                                205
Gln Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser
                        215
                                            220
Ser His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn
                    230
                                        235
Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
                245
                                    250
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val
            260
                                265
                                                    270
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
                            280
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
                        295
Tyr Glu Gln Met Ser Glu Leu Glu Glu Arg Ile Ala Arg Ile Ile Pro
                    310
                                        315
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
                325
                                    330
Pro Ser Pro Gln Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro Gln
            340
                                345
                                                     350
Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala Val
                            360
Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser Arg
                        375
                                            380
Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala Gly Ile Asp
                    390
                                        395
Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Thr Lys
                405
                                    410
Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala Tyr
            420
                                425
Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
                            440
                                                445
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
                        455
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Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
                    470
                                        475
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
               485
                                    490
Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
                                505
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
                            520
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
                        535
                                            540
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr
                    550
                                        555
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
                565
                                    570
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
            580
                                585
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
                            600
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
                        615
                                            620
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
                    630
                                        635
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
                645
                                    650
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
                                665
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
                           680
                                                685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
                        695
                                            700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
                    710
                                        715
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
                725
                                    730
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
            740
                                745
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
       755
                            760
                                                765
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
                       775
                                            780
Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
                    790
                                        795
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
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      <213> S. pneumoniae
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Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
                            40
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Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
                   70
                                        75
Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn
                                105
Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
       115
                            120
                                                125
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
                       135
His Gly Gly Gly Ser Asn Asp Gln Ala Val Val Ala Ala Arg Ala Gln
                    150
                                        155
Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile
                165
                                    170
Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro Arg Gly Asn His Phe
           180
                               185
His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala
                            200
Gln Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser
                        215
Ser His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn
                    230
                                        235
Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
                                    250
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg Arg Val
           260
                               265
                                                    270
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
                            280
                                                285
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
                        295
                                            300
Tyr Glu Gln Met Ser Glu Leu Glu Glu Arg Ile Ala Arg Ile Ile Pro
                    310
                                        315
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
                325
                                    330
Pro Ser Pro Gln Pro Ser Pro Gln Pro Ala Pro Asn Pro Gln
            340
                                345
Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala Val
                            360
Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser Arg
                        375
                                            380
Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala Gly Ile Asp
                    390
                                        395
Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Thr Lys
                405
                                    410
Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala Tyr
            420
                                425
Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
                            440
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
                        455
Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
                   470
                                       475
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
                485
                                    490
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Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
                                505
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
        515
                           520
                                                525
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
                        535
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Gln Ala Tyr
                    550
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
                565
                                    570
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
                                585
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
                            600
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
                        615
                                            620
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
                   630
                                        635
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
                645
                                    650
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
                                665
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
                            680
                                                685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
                        695
                                            700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
                    710
                                        715
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
                725
                                    730
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
           740
                               745
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
       755
                            760
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
                        775
                                            780
Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
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                                        795
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
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     <400> 95
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Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
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Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
                            40
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
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55

70

Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile

60

Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Gln Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Asn Gly Val Ala Val Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Gln Leu Ser Pro Leu Glu Glu Lys Leu Ala Arg Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Pro Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile

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Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
                        535
                                            540
His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
                   550
                                       555
Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
                                    570
Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
                                585
Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn
                            600
Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His
                        615
Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
                    630
                                        635
Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val
                645
                                    650
Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
            660
                                665
Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala
                            680
Asp Thr Asn Gln Thr Glu Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu
                        695
Lys Pro Glu Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr His
                    710
                                        715
Pro Glu Ser Asp Glu Lys Glu Asn His Val Gly Leu Asn Pro Ser Ala
               725
                                    730
Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu
            740
                                745
                                                    750
Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Tyr Ser
                            760
Val Ile Asn Ala Lys Ile Ala Glu Ala Glu Ala Leu Leu Glu Lys Val
                        775
                                            780
Thr Asp Ser Ser Ile Arg Gln Asn Ala Val Glu Thr Leu Thr Gly Leu
                    790
                                        795
Lys Ser Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala
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                                    810
Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala Pro
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Ile Gln
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<211> 811
<212> PRT
<213> S. pneumoniae
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<400> 96

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Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
                            120
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
                        135
His Gly Gly Gly Ser Asn Asp Gln Ala Val Val Ala Ala Arg Ala Gln
                    150
                                        155
Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile
                165
                                   170
Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asn His Phe
           180
                                185
His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala
                           200
       195
                                                205
Gln Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser
                        215
                                            220
Ser His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn
                    230
                                        235
Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
                245
                                    250
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val
           260
                                265
                                                    270
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
                            280
                                                285
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
                        295
                                            300
Tyr Glu Gln Met Ser Glu Leu Glu Glu Arg Ile Ala Arg Ile Ile Pro
                    310
                                        315
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
               325
                                    330
Pro Ser Pro Gln Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro Gln
                                345
Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala Val
                            360
Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser Arg
                        375
                                            380
Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala Gly Ile Asp
                   390
                                        395
Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Thr Lys
                405
                                    410
Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala Tyr
           420
                                425
                                                    430
Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
                            440
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
                        455
                                            460
Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
                    470
                                        475
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
                485
                                    490
Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
                                505
                                                   510
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
       515
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Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
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Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr
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                                       555
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
                565
                                    570
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
                                585
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
        595
                            600
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
                        615
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
                   630
                                        635
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
               645
                                    650
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
           660
                                665
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
                            680
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
                        695
                                            700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
                    710
                                        715
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
                                    730
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
           740
                                745
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
                            760
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
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                                            780
Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
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                                        795
Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Lys
                805
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      <211> 811
      <212> PRT
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Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Asp Lys Lys Glu
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Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
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Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
                        55
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
                                        75
Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
                85
                                    90
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Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn

105

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Gly Lys Tyr Tyr Gly Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
                            120
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
                        135
                                            140
His Gly Gly Gly Ser Asn Asp Gln Ala Val Val Ala Ala Arq Ala Gln
                                         155
Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile
                                     170
Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asn His Phe
            180
                                185
His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala
                            200
Gln Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser
                        215
                                             220
Ser His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn
                    230
                                         235
Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
                245
                                    250
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val
            260
                                 265
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
        275
                             280
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
                        295
                                             300
Tyr Glu Gln Met Ser Glu Leu Glu Glu Arg Ile Ala Arg Ile Ile Pro
                    310
                                        315
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
                325
                                    330
Pro Ser Pro Gln Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro Gln
            340
                                 345
Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala Val
                            360
Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser Arg
                        375
Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala Gly Ile Asp
                    390
Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Thr Lys
                405
                                    410
Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala Tyr
                                425
Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
                             440
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
                        455
                                             460
Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
                    470
                                         475
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
                485
                                     490
Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
                                 505
                                                     510
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
                            520
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
                        535
                                            540
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Gln Ala Tyr
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                                         555
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Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
                565
                                    570
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
                                585
           580
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
                           600
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
                        615
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
                    630
                                        635
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
                645
                                    650
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
                                665
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
       675
                           680
                                                685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
                       695
                                            700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
                    710
                                        715
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
                                    730
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
           740
                                745
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
                           760
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
                       775
                                           780
Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
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                                        795
Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Lys
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<211> 811

<212> PRT

<213> S. pneumoniae

<400> 98

Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Asp Lys Lys Glu 10 Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala 25 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala 40 45 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His 55 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp 85 90 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn 105 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile 120 125 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn 130 135 140

- 1	His 145	Gly	Gly	Gly	Ser	Asn 150	Asp	Gln	Ala	Val	Val 155	Ala	Ala	Arg	Ala	Gln 160
. (Зlу	Arg	Tyr	Thr	Thr 165	Asp	Asp	Gly	Tyr	Ile 170	Phe	Asn	Ala	Ser	Asp 175	Ile
-	Ile	Glu	Asp	Thr 180	Gly	Asp	Ala	Tyr	Ile 185	Val	Pro	His	Gly	Asn 190		Phe
I	His	Tyr	Ile 195		Lys	Ser	Asp	Leu 200		Ala	Ser	Glu	Leu 205		Ala	Ala
(31n	Ala 210		Trp	Asn	Gly	Lys 215		Gly	Ser	Arg	Pro 220		Ser	Ser	Ser
	Ser 225	His	Asn	Ala	Asn	Pro 230		Gln	Pro	Arg	Leu 235	-	Glu	Asn	His	Asn 240
		Thr	Val	Thr	Pro 245		Tyr	His	Gln	Asn 250		Gly	Glu	Asn	Ile 255	
S	Ser	Leu	Leu	Arg 260		Leu	Tyr	Ala	Lys 265		Leu	Ser	Glu	Arg 270		Val
C	Glu	Ser	Asp 275		Leu	Ile	Phe	Asp 280		Ala	Gln	Ile	Thr 285		Arg	Thr
7	Ala	Arg 290		Val	Ala	Val	Pro 295		Gly	Asn	His	Tyr 300		Phe	Ile	Pro
	Tyr 305	Glu	Gln	Met	Ser	Glu 310		Glu	Glu	Arg	Ile 315		Arg	Ile	Ile	Pro 320
		Arg	Tyr	Arg	Ser 325		His	Trp	Val	Pro 330	_	Ser	Arg	Pro	Glu 335	
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I	?ro	Ala	Pro 355	Ser	Asn	Pro	Ile	Asp 360	Glu	Lys	Leu	Val	Lys 365	Glu	Ala	Val
I	٩rg	Lys 370	Val	Gly	Asp	Gly	Tyr 375	Val	Phe	Glu	Glu	Asn 380	Gly	Val	Ser	Arg
	Tyr 385	Ile	Pro	Ala	Lys	Asp 390	Leu	Ser	Ala	Glu	Thr 395	Ala	Ala	Gly	Ile	Asp 400
S	Ser	_	Lou	Ala	Lvs	Gln	01	Ser	T.e.11	Ser	Hie	Lys	Leu	Gly	Thr	Lys
		Lys	ьеu		405	0211	GIU	501	Dea	410	1113	_			415	
Ι		Lys Thr			405					410				Lys 430	415	Tyr
	ŗys		Asp	Leu 420	405 Pro	Ser	Ser	Asp	Arg 425	410 Glu	Phe	Tyr	Asn	430	415 Ala	
P	ysb Tab	Thr	Asp Leu 435	Leu 420 Ala	405 Pro Arg	Ser Ile	Ser His	Asp Gln 440	Arg 425 Asp	410 Glu Leu	Phe Leu	Tyr Asp	Asn Asn 445	430 Lys	415 Ala Gly	Arg
7	Lys Asp Eln	Thr Leu Val	Asp Leu 435 Asp	Leu 420 Ala Phe	405 Pro Arg Glu	Ser Ile Ala	Ser His Leu 455	Asp Gln 440 Asp	Arg 425 Asp Asn	410 Glu Leu Leu	Phe Leu Leu	Tyr Asp Glu 460	Asn Asn 445 Arg	430 Lys Leu	415 Ala Gly Lys	Arg Asp
7 C	Lys Asp Eln Val	Thr Leu Val 450	Asp Leu 435 Asp Ser	Leu 420 Ala Phe Asp	405 Pro Arg Glu Lys	Ser Ile Ala Val 470	Ser His Leu 455 Lys	Asp Gln 440 Asp Leu	Arg 425 Asp Asn Val	410 Glu Leu Leu Glu	Phe Leu Leu Asp 475	Tyr Asp Glu 460 Ile	Asn Asn 445 Arg Leu	430 Lys Leu Ala	415 Ala Gly Lys Phe	Arg Asp Leu 480
I C	Lys Asp Eln Val 165 Ala	Thr Leu Val 450 Ser	Asp Leu 435 Asp Ser Ile	Leu 420 Ala Phe Asp	405 Pro Arg Glu Lys His 485	Ser Ile Ala Val 470 Pro	Ser His Leu 455 Lys Glu	Asp Gln 440 Asp Leu Arg	Arg 425 Asp Asn Val Leu	410 Glu Leu Leu Glu Gly 490	Phe Leu Leu Asp 475 Lys	Tyr Asp Glu 460 Ile Pro	Asn 445 Arg Leu Asn	430 Lys Leu Ala Ser	415 Ala Gly Lys Phe Gln 495	Arg Asp Leu 480 Ile
7 0 1 2 7	Lys Asp Sln Val 165 Ala	Thr Leu Val 450 Ser Pro	Asp Leu 435 Asp Ser Ile Thr	Leu 420 Ala Phe Asp Arg Asp 500	405 Pro Arg Glu Lys His 485 Asp	Ser Ile Ala Val 470 Pro	Ser His Leu 455 Lys Glu Ile	Asp Gln 440 Asp Leu Arg Gln	Arg 425 Asp Asn Val Leu Val 505	410 Glu Leu Leu Glu Gly 490 Ala	Phe Leu Leu Asp 475 Lys	Tyr Asp Glu 460 Ile Pro Leu	Asn 445 Arg Leu Asn Ala	430 Lys Leu Ala Ser Gly 510	415 Ala Gly Lys Phe Gln 495 Lys	Arg Asp Leu 480 Ile Tyr
7 V 4 7	Asp Sln Val 165 Ala Thr	Thr Leu Val 450 Ser Pro	Asp Leu 435 Asp Ser Ile Thr Glu 515	Leu 420 Ala Phe Asp Arg Asp 500 Asp	405 Pro Arg Glu Lys His 485 Asp	Ser Ile Ala Val 470 Pro Glu Tyr	Ser His Leu 455 Lys Glu Ile	Asp Gln 440 Asp Leu Arg Gln Phe 520	Arg 425 Asp Asn Val Leu Val 505 Asp	410 Glu Leu Leu Glu Gly 490 Ala Pro	Phe Leu Leu Asp 475 Lys Lys	Tyr Asp Glu 460 Ile Pro Leu Asp	Asn Asn 445 Arg Leu Asn Ala Ile 525	430 Lys Leu Ala Ser Gly 510 Thr	415 Ala Gly Lys Phe Gln 495 Lys Ser	Arg Asp Leu 480 Ile Tyr Asp
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	Asp Asp In Val 165 Ala Thr Chr Glu	Thr Leu Val 450 Ser Pro Tyr Thr Gly 530 Lys	Asp Leu 435 Asp Ser Ile Thr Glu 515 Asp Asp	Leu 420 Ala Phe Asp Arg Asp 500 Asp Ala Ser Lys	405 Pro Arg Glu Lys His 485 Asp Gly Tyr Leu Gly 565	Ser Ile Ala Val 470 Pro Glu Tyr Val Ser 550 Leu	Ser His Leu 455 Lys Glu Ile Thr 535 Glu Thr	Asp Gln 440 Asp Leu Arg Gln Phe 520 Pro Ala Pro	Arg 425 Asp Asn Val Leu Val 505 Asp His Glu	410 Glu Leu Glu Gly 490 Ala Pro Met Arg Ser 570	Phe Leu Leu Asp 475 Lys Lys Arg Thr Ala 555 Thr	Tyr Asp Glu 460 Ile Pro Leu Asp His 540 Ala Asp	Asn 445 Arg Leu Asn Ala Ile 525 Ser Ala His	430 Lys Leu Ala Ser Gly 510 Thr His Gln	415 Ala Gly Lys Phe Gln 495 Lys Ser Trp Ala Asp 575	Arg Asp Leu 480 Ile Tyr Asp Ile Tyr 560 Ser

Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr 600 Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His 615 Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala 630 635 Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn 665 Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro 680 Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu 695 700 Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn 710 715 Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu 725 730 Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile 740 745 Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp 760 Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser 775 780 Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val 790 Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Lys 805 <210> 99 <211> 811 <212> PRT <213> S. pneumoniae <400> 99 Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys Lys Glu Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala 25 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala 40 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His 55 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile 70 75 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp 105

Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile

His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly

Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile

155

175

170

120 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn

135

150

165

115

Glu	Asp	Thr	Gly 180	Asp	Ala	Tyr	Ile	Val 185	Pro	His	Gly	Asp	His 190	Tyr	His
Tyr	Ile	Pro 195	Lys	Ser	Asp	Leu	Ser 200	Ala	Ser	Glu	Leu	Ala 205	Ala	Ala	Gln
Ala	Tyr 210	Trp	Asn	Gly	Lys	Gln 215	Gly	Ser	Arg	Pro	Ser 220	Ser	Ser	Ser	Ser
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	Val			245					250					255	
	Leu		260					265					270		
	Asp	275					280					285			
	Gly 290					295		_		_	300				_
305	Gln -				310			_		315	_				320
	Tyr			325					330					335	
	Pro		340					345					350		
	Pro	355					360					365			
	Ala 370					375					380				_
385	Pro				390					395					400
	Ile			405					410					415	
	Ala		420					425		_			430	_	
	Ala Gly	435					440				_	445		_	
	450 Lys					455					460				_
465	Phe				470					475					480
	Gln			485					490					495	
	Lys		500					505					510		
	Ser	515					520					525			
	530 Trp					535					540				
545	Ala				550					555					560
	Asp			565					570					575	
	Val		580					585					590		
	Gln	595					600					605			
	610	-1-			cru	615	-10	11011	C-y	~~1	620	-T-C	-1-C	110	*****

Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu 630 635 Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val 645 650 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly 665 Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala 680 Asp Thr Asn Gln Thr Glu Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu 695 700 Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys 710 715 Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu 725 730 Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val 740 745 Lys Glu Lys Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asn 760 Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn 775 780 Asn Leu Leu Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala 790 Glu Lys Leu Leu Ala Leu Leu Lys Glu Ser Lys 805 <210> 100

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205

Ala	Tyr 210	Trp	Asn	Gly	Lys	Gln 215	Gly	Ser	Arg	Pro	Ser 220	Ser	Ser	Ser	Ser
Tyr 225	Asn	Ala	Asn	Pro	Ala 230	Gln	Pro	Arg	Leu	Ser 235	Glu	Asn	His	Asn	Leu 240
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Leu	Leu	Arg	Glu 260	Leu	Tyr	Ala	Lys	Pro 265	Leu	Ser	Glu	Arg	His 270	Val	Glu
Ser	Asp	Gly 275	Leu	Ile	Phe	Asp	Pro 280	Ala	Gln	Ile	Thr	Ser 285	Arg	Thr	Ala
	290		Ala			295					300				
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		•	Pro 340					345					350		
		355	Ile				360					365			
	370		Tyr			375			_		380	_	_		
385			Leu		390					395					400
			Glu	405					410					415	
			Ser 420					425					430		
		435	His		-		440	_		_	_	445			_
	450		Leu			455					460				
465			Lys		470		_			475					480
Arg	nis.			ALU	ьeu		1.05			Ala	GIII	TTE	THE		THI
7 00		Pro		485			_		490					495	G1.,
	Asp	Glu	Ile 500	485 Gln	Val	Ala	Lys	Leu 505	490 Ala	Gly	Lys	Tyr	Thr 510	495 Thr	
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Asp Ala	Asp Gly Tyr 530	Glu Tyr 515 Val	Ile 500 Ile Thr	485 Gln Phe Pro	Val Asp His	Ala Pro Met 535	Lys Arg 520 Thr	Leu 505 Asp His	490 Ala Ile Ser	Gly Thr His	Lys Ser Trp 540	Tyr Asp 525 Ile	Thr 510 Glu Lys	495 Thr Gly Lys	Asp Asp
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Asp Ala Ser 545 Lys	Asp Gly Tyr 530 Leu Gly	Glu Tyr 515 Val Ser Leu	Ile 500 Ile Thr Glu	485 Gln Phe Pro Ala Pro 565	Val Asp His Glu 550 Pro	Ala Pro Met 535 Arg	Lys Arg 520 Thr Ala Thr	Leu 505 Asp His Ala Asp	490 Ala Ile Ser Ala His 570	Gly Thr His Gln 555 Gln	Lys Ser Trp 540 Ala Asp	Tyr Asp 525 Ile Tyr Ser	Thr 510 Glu Lys Ala Gly	495 Thr Gly Lys Lys Asn 575	Asp Asp Glu 560 Thr
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Asp Ala Ser 545 Lys Glu Lys	Asp Gly Tyr 530 Leu Gly Ala Val	Glu Tyr 515 Val Ser Leu Lys Pro 595	Ile 500 Ile Thr Glu Thr Gly 580 Leu	485 Gln Phe Pro Ala Pro 565 Ala Asp	Val Asp His Glu 550 Pro Glu Arg	Ala Pro Met 535 Arg Ser Ala Met	Lys Arg 520 Thr Ala Thr Ile Pro 600	Leu 505 Asp His Ala Asp Tyr 585 Tyr	490 Ala Ile Ser Ala His 570 Asn	Gly Thr His Gln 555 Gln Arg Leu	Lys Ser Trp 540 Ala Asp Val Gln	Tyr Asp 525 Ile Tyr Ser Lys Tyr 605	Thr 510 Glu Lys Ala Gly Ala 590 Thr	495 Thr Gly Lys Lys Asn 575 Ala	Asp Glu 560 Thr Lys Glu
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Asp Ala Ser 545 Lys Glu Lys Val Ile 625	Asp Gly Tyr 530 Leu Gly Ala Val Lys 610 Lys	Glu Tyr 515 Val Ser Leu Lys Pro 595 Asn Phe	Ile 500 Ile Thr Glu Thr Gly 580 Leu	485 Gln Phe Pro Ala Pro 565 Ala Asp Ser Trp	Val Asp His Glu 550 Pro Glu Arg Leu Phe 630	Ala Pro Met 535 Arg Ser Ala Met Ile 615 Asp	Lys Arg 520 Thr Ala Thr Ile Pro 600 Ile Glu	Leu 505 Asp His Ala Asp Tyr 585 Tyr Pro	490 Ala Ile Ser Ala His 570 Asn His Leu	Gly Thr His Gln 555 Gln Arg Leu Tyr Tyr 635	Lys Ser Trp 540 Ala Asp Val Gln Asp 620 Glu	Tyr Asp 525 Ile Tyr Ser Lys Tyr 605 His	Thr 510 Glu Lys Ala Gly Ala 590 Thr Tyr	495 Thr Gly Lys Lys Asn 575 Ala Val His	Asp Glu 560 Thr Lys Glu Asn Gly 640

Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp 665 His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn Gln Thr Glu 680 675 685 Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr 695 Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro 710 715 Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Pro Glu Glu Ser 725 730 Glu Glu Pro Gln Val Glu Thr Glu Lys Val Lys Glu Lys Leu Arg Glu 745 Ala Glu Asp Leu Leu Gly Lys Ile Gln Asn Pro Ile Ile Lys Ser Asn 760 765 Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr 775 780 Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu 790 795 Leu Lys Glu Ser Lys

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Thr															
	Val	Thr	Pro	Thr 245	Tyr	His	Gln	Asn	Gln 250	Gly	Glu	Asn	Ile	Ser 255	Ser
Leu	Leu	Arg	Glu 260	Leu	Tyr	Ala	Lys	Pro 265	Leu	Ser	Glu	Arg	His 270	Val	Glu
Ser	Asp	Gly 275	Leu	Ile	Phe	Asp	Pro 280	Ala	Gln	Ile	Thr	Ser 285	Arg	Thr	Ala
Arg	Gly 290	Val	Ala	Val	Pro	His 295	Gly	Asn	His	Tyr	His 300	Phe	Ile	Pro	Tyr
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Asn	Pro	Gln 355	Pro	Ala	Pro	Ser	Asn 360	Pro	Ile	Asp	Glu	Lys 365	Leu	Val	Lys
	370			_	Val	375	_	_	_		380		_		_
Val 385	Ser	Arg	Tyr	Ile	Pro 390	Ala	Lys	Asn	Leu	Ser 395	Ala	Glu	Thr	Ala	Ala 400
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Ala Gly Thr His 545	Gln Lys Ser 530 Trp	Ile Tyr 515 Asp Ile	Thr 500 Thr Glu Lys	485 Tyr Thr Gly Lys	Thr Glu Asp Asp 550	Asp Asp Ala 535 Ser	Asp Gly 520 Tyr Leu	Glu 505 Tyr Val Ser	490 Ile Ile Thr	Gln Phe Pro Ala 555	Val Asp His 540 Glu	Ala Pro 525 Met Arg	Lys 510 Arg Thr	495 Leu Asp His	Ala Ile Ser Ala 560
Ala Gly Thr His 545 Gln	Gln Lys Ser 530 Trp	Ile Tyr 515 Asp Ile Tyr	Thr 500 Thr Glu Lys Ala	485 Tyr Thr Gly Lys 565	Thr Glu Asp Asp 550 Glu	Asp Asp Ala 535 Ser Lys	Asp Gly 520 Tyr Leu Gly	Glu 505 Tyr Val Ser Leu	490 Ile Ile Thr Glu Thr 570	Gln Phe Pro Ala 555 Pro	Val Asp His 540 Glu Pro	Ala Pro 525 Met Arg Ser	Lys 510 Arg Thr Ala	Asp His Ala Asp 575	Ala Ile Ser Ala 560 His
Ala Gly Thr His 545 Gln Gln	Gln Lys Ser 530 Trp Ala Asp	Ile Tyr 515 Asp Ile Tyr Ser	Thr 500 Thr Glu Lys Ala Gly 580	485 Tyr Thr Gly Lys 565 Asn	Thr Glu Asp Asp 550 Glu Thr	Asp Asp Ala 535 Ser Lys Glu	Asp Gly 520 Tyr Leu Gly Ala	Glu 505 Tyr Val Ser Leu Lys 585	490 Ile Ile Thr Glu Thr 570 Gly	Gln Phe Pro Ala 555 Pro	Val Asp His 540 Glu Pro Glu	Ala Pro 525 Met Arg Ser Ala	Lys 510 Arg Thr Ala Thr Ile 590	Asp His Ala Asp 575 Tyr	Ala Ile Ser Ala 560 His Asn
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Ala Gly Thr His 545 Gln Gln Arg Leu Tyr 625	Gln Lys Ser 530 Trp Ala Asp Val Gln 610 Asp	Ile Tyr 515 Asp Ile Tyr Ser Lys 595 Tyr His	Thr 500 Thr Glu Lys Ala Gly 580 Ala Thr	485 Tyr Thr Gly Lys 565 Asn Ala Val His	Thr Glu Asp 550 Glu Thr Lys Glu Asn 630	Asp Ala 535 Ser Lys Glu Lys Val 615 Ile	Asp Gly 520 Tyr Leu Gly Ala Val 600 Lys	Glu 505 Tyr Val Ser Leu Lys 585 Pro Asn Phe	490 Ile Ile Thr Glu Thr 570 Gly Leu Gly Glu	Gln Phe Pro Ala 555 Pro Ala Asp Ser Trp 635	Val Asp His 540 Glu Pro Glu Arg Leu 620 Phe	Ala Pro 525 Met Arg Ser Ala Met 605 Ile Asp	Lys 510 Arg Thr Ala Thr Ile 590 Pro Ile Glu	A95 Leu Asp His Ala Asp 575 Tyr Tyr Pro Gly	Ala Ile Ser Ala 560 His Asn Asn Leu 640
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Ala Gly Thr His 545 Gln Gln Arg Leu Tyr 625 Tyr Lys	Gln Lys Ser 530 Trp Ala Asp Val Gln 610 Asp Glu Tyr	Ile Tyr 515 Asp Ile Tyr Ser Lys 595 Tyr His Ala Tyr	Thr 500 Thr Glu Lys Ala Gly 580 Ala Thr Tyr Pro Val 660	485 Tyr Thr Gly Lys 565 Asn Ala Val His 645 Glu	Thr Glu Asp 550 Glu Thr Lys Glu Asn 630	Asp Ala 535 Ser Lys Glu Lys Val 615 Ile Tyr Pro	Asp Gly 520 Tyr Leu Gly Ala Val 600 Lys Lys Thr Asn	Glu 505 Tyr Val Ser Leu Lys 585 Pro Asn Phe Leu Glu 665	490 Ile Ile Thr Glu Thr 570 Gly Leu Gly Glu 650 Arg	Gln Phe Pro Ala 555 Pro Ala Asp Ser Trp 635 Asp	Val Asp His 540 Glu Pro Glu Arg Leu 620 Phe Leu His	Ala Pro 525 Met Arg Ser Ala Met 605 Ile Asp Leu Ser	Lys 510 Arg Thr Ala Thr Ile 590 Pro Ile Glu Ala Asp 670	Asp His Ala Asp 575 Tyr Tyr Pro Gly Thr 655 Asn	Ala Ile Ser Ala 560 His Asn Asn His Leu 640 Val



Asp	Thr 690	Asn	Gln	Thr	Glu	Lys 695	Pro	Ser	Glu	Glu	Lys 700	Pro	Gln	Thr	Glu
Lys 705	Pro	Glu	Glu	Glu	Thr 710	Pro	Arg	Glu	Glu	Lys 715	Pro	Gln	Ser	Glu	Lys 720
Pro	Glu	Ser	Pro	Lys 725	Pro	Thr	Glu	Glu	Pro 730	Glu	Glu	Glu	Ser	Pro 735	Glu
Glu	Ser	Glu	Glu 740	Pro	Gln	Val	Glu	Thr 745	Glu	Lys	Val	Glu	Glu 750	Lys	Leu
Arg	Glu	Ala 755	Glu	Asp	Leu	Leu	Gly 760	Lys	Ile	Gln	Asp	Pro 765	Ile	Ile	Lys
Ser	Asn 770	Ala	Lys	Glu	Thr	Leu 775	Thr	Gly	Leu	Lys	Asn 780	Asn	Leu	Leu	Phe
Gly 785	Thr	Gln	Asp	Asn	Asn 790	Thr	Ile	Met	Ala	Glu 795	Ala	Glu	Lys	Leu	Leu 800
Ala	Leu	Leu	Lys	Glu 805	Ser	Lys									
		110.	100												

<210> 102

<211> 821

<212> PRT

<400> 102

<213> S. pneumoniae

Cys Ala Tyr Glu Leu Gly Leu His Gln Ala Gln Thr Val Lys Glu Asn 1

Asn Arg Val Ser Tyr Ile Asp Gly Lys Gln Ala Thr Gln Lys Thr Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile

Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly 105 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg 120 115

70

135 Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser 150 Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp 165

180

230 245

260

170 Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His 185 Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala 200 Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr 215 220 Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro 235 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser 250

265

10

90

75

155

125

140

25

40

Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu His Ser Gln His Arg

Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu





Tara	C1 n	Т олл	Ф	T	Т от	Dwo	Τ	C	C1~	7	TT - ~	1707	G1	C	7
		275					280					285		Ser	
Gly	Leu 290	Ile	Phe	Asp	Pro	Ala 295	Gln	Ile	Thr	Ser	Arg 300	Thr	Ala	Arg	Gly
Val 305	Ala	Val	Pro	His	Gly 310	Asn	His	Tyr	His	Phe 315	Ile	Pro	Tyr	Glu	Gln 320
Met	Ser	Glu	Leu	Glu 325	Lys	Arg	Ile	Ala	Arg 330	Ile	Ile	Pro	Leu	Arg 335	Tyr
Arg	Ser	Asn	His 340		Val	Pro	Asp	Ser 345		Pro	Glu	Glu	Pro 350	Ser	Pro
Gln	Pro	Thr		Glu	Pro	Ser	Pro 360		Pro	Gln	Pro	Ala 365		Asn	Pro
Gln	Pro		Pro	Ser	Asn	Pro 375		Asp	Glu	Lys	Leu 380		Lys	Glu	Ala
Val 385		Lys	Val	Gly	Asp 390		Tyr	Val	Phe	Glu 395		Asn	Gly	Val	Ser 400
	Tyr	Ile	Pro	Ala 405		Asn	Leu	Ser	Ala 410		Thr	Ala	Ala	Gly 415	
Asp	Ser	Lys	Leu 420		Lys	Gln	Glu	Ser 425		Ser	His	Lys	Leu 430	Gly	Ala
Lys	Lys	Thr 435	Asp	Leu	Pro	Ser	Ser 440		Arg	Glu	Phe	Tyr 445		Lys	Ala
Tyr	Asp 450	Leu	Leu	Ala	Arg	Ile 455	His	Gln	Asp	Leu	Leu 460	Asp	Asn	Lys	Gly
Arg 465	Gln	Val	Asp	Phe	Glu 470	Ala	Leu	Asp	Asn	Leu 475	Leu	Glu	Arg	Leu	Lys 480
Asp	Val	Ser	Ser	Asp 485	Lys	Val	Lys	Leu	Val 490	Asp	Asp	Ile	Leu	Ala 495	Phe
Leu	Ala	Pro	Ile 500	Arg	His	Pro	Glu	Arg 505	Leu	Gly	Lys	Pro	Asn 510	Ala	Gln
Ile	Thr	Tyr 515	Thr	Asp	Asp	Glu	Ile 520	Gln	Val	Ala	Lys	Leu 525	Ala	Gly	Lys
Tyr	Thr 530	Thr	Glu	Asp	Gly	Tyr 535	Ile	Phe	Asp	Pro	Arg 540	Asp	Ile	Thr	Ser
Asp 545	Glu	Gly	Asp	Ala	Tyr 550	Val	Thr	Pro	His	Met 555	Thr	His	Ser	His	Trp 560
Ile	Lys	Lys	Asp	Ser 565	Leu	Ser	Glu	Ala	Glu 570	Arg	Ala	Ala	Ala	Gln 575	Ala
Tyr	Ala	Lys	Glu 580	Lys	Gly	Leu	Thr	Pro 585	Pro	Ser	Thr	Asp	His 590	Gln	Asp
Ser	Gly	Asn 595	Thr	Glu	Ala	Lys	Gly 600	Ala	Glu	Ala	Ile	Tyr 605	Asn	Arg	Val
Lys	Ala 610	Ala	Lys	Lys	Val	Pro 615	Leu	Asp	Arg	Met	Pro 620	Tyr	Asn	Leu	Gln
Tyr 625	Thr	Val	Glu	Val	Lys 630	Asn	Gly	Ser	Leu	Ile 635	Ile	Pro	His	Tyr	Asp 640
His	Tyr	His	Asn	Ile 645	Lys	Phe	Glu	Trp	Phe 650	Asp	Glu	Gly	Leu	Tyr 655	Glu
Ala	Pro	Lys	Gly 660	Tyr	Thr	Leu	Glu	Asp 665	Leu	Leu	Ala	Thr	Val 670	Lys	Tyr
Tyr	Val	Glu 675	His	Pro	Asn	Glu	Arg 680	Pro	His	Ser	Asp	Asn 685	Gly	Phe	Gly
Asn	Ala 690	Ser	Asp	His	Val	Gln 695	Arg	Asn	Lys	Asn	Gly 700	Gln	Ala	Asp	Thr
Asn 705	Gln	Thr	Glu	Lys	Pro 710	Ser	Glu	Glu	Lys	Pro 715	Gln	Thr	Glu	Lys	Pro 720





Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu 730 725 Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser 740 745 Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu 760 765 Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn 775 Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr 790 795 Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu 805 Leu Lys Glu Ser Lys 820

33 Cont